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PROGRAMMATIC RESEARCH AND AGRICULTURAL POLICY

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AMERICAN agriculture, including related research and administration, has always been, and is today, in flux. Assuming the continuing importance of public policy for agriculture, I am here arguing the need for considered research policy in order to achieve systematic examination of the issues raised thereby. The concept is called "programmatic research." Its nature and necessity are analyzed against the background of institutional development of agricultural government in this country. The major thesis is that programmatic research should be thoroughly grounded and vigorously prosecuted on both sides of the federal system. A companion thesis, asserted rather than examined in these pages, is that such research should marshal the best abilities of agricultural professionals in all disciplines—natural as well as social sciences. Another implicit thesis is that *scientists should act like scientists*, continually and freely searching for the consequences of alternative governmental policies for agriculture, while recognizing that the decision upon the actual content of governmental policy must be

* Full responsibility for this paper is mine. Without implying any acceptance on their part of ideas or analyses contained herein, I am very grateful to the following men for their willingness to read and comment upon earlier drafts: in the United States Department of Agriculture, O. V. Wells and Charles E. Kellogg; in the Department of the Interior, Marion Clawson; among Experiment Station Directors, R. E. Buchanan and Noble Clark; at the Stanford Food Research Institute, J. S. Davis and Holbrook Working; among agricultural economists, Professors T. W. Schultz (University of Chicago) and J. R. Greenman (University of Florida); among political scientists, Professors John M. Gaus (University of Wisconsin), H. J. Morgenthau and Avery Leiserson (University of Chicago), and William Anderson (University of Minnesota.)

left up to the politicians and the parties as only these are responsible to the electorate.

Sharp attacks upon the economic investigatory role of the Bureau of Agricultural Economics culminated in a marked budget reduction in 1946. Since then there has been considerable change in the directing personnel and in the general organization of BAE's work. The BAE may continue to operate vigorously as an agency for "programmatic research." If so, it will be a tribute to excellent personal relationships between BAE leaders and others. But are good personal relationships all we can hope for? Must we rest upon the assumption that governmental research agencies will continue to attract and keep the services of able men whose work bears closely upon the operations of governmental policies for agriculture? This paper hopes to contribute to a clarification of principles that show the need for and the role of programmatic research. It also offers some suggestions as to how such research might be institutionalized as a recognized function of government.

But the inquiry cannot be focused upon Washington. In this country governmental powers are divided along federal lines. In analyzing the research function, we shall have to examine agencies upon both sides of the federal system. At the outset, the current tendencies toward decentralization must be recognized. Regional offices of central agencies are favorite targets. Those of the old Agricultural Adjustment Administration (now the Field Service Branch of the Production and Marketing Administration), the Farmers Home Administration (formerly Farm Security Administration), and the BAE are gone or going. Farmers Home Administration and the Soil Conservation Service are in continuous struggles for existence; the Rural Electrification Administration, only less so. Contrarily, the Hope-Flannagan Act adds considerably to the financing of state institutions, chiefly Land-Grant Colleges and Universities.

Since in an interpretative essay my own beliefs and valuations become particularly important, I shall attempt to state what these are—some now and some later. *First*, I subscribe to the following statement of the Executive Committee and the Agricultural Policy Committee of the Association of Land-Grant Colleges and Universities (LGCA):

"The agricultural colleges and experiment stations in the several States are convinced that many, if not most, of the major difficulties which will

confront American farmers in the years ahead concern economic issues such as: (a) Prices for products sold by farmers and articles purchased by them; (b) readjustment of wartime agricultural production programs to meet changed conditions; (c) provision of adequate employment opportunities for rural people; (d) ways of improving the level of living of farm operators and their families; (e) maintaining urban employment and income, and an abundant world trade.

"Likewise, the land-grant institutions believe that progress in the solution of these economic problems is largely dependent upon finding the facts on which sound economic policies must be based. This in turn means economic research and economic analysis on a national basis."[1]

Second, neither in the United States Department of Agriculture (USDA) nor in the Land-Grant Colleges is there an effective alternative to giving the BAE or some other USDA bureau definite responsibility for programmatic research. In partial support, let me again cite the LGCA statement:

"Surely the Congress will not make such a drastic cut in funds for the support of economic research in the face of certain fact that no other agency will be able to make up that curtailment. The individual land-grant institutions already are carrying greatly increased burdens due to enormously expanded veteran enrollments, and the necessity of helping the farmers of their respective States to make necessary adjustments to changed local conditions created by war and the aftermath of war. They have no intention of reducing their programs of agricultural economics research, but they are not in position to absorb with State-funds anything like an additional $500,000 program of agricultural economics research; neither is any State institution in a position to carry on the Nation-wide economic research now conducted by the Bureau of Agricultural Economics."[2]

Third, support must be widely marshalled. The USDA, the colleges, the Association of the Land Grant Colleges and Universities, and others should press for programmatic research in agriculture. Moreover (as is argued later), college support of BAE can help ground agricultural policy on a strong research program, fully cooperative with the colleges.[3]

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[1] *Hearings*, Senate Committee on Appropriations, Sub-Committee on Agriculture, fiscal, 1947, pp. 529–531. Henceforth referred to as the LGCA statement.

[2] Since this testimony, the passage of The Hope-Flannagan Act promises to ease the financial situation considerably. Yet this is thought not to change the general argument in this paper for institutionalizing a part of the programmatic research function in Washington.

[3] As will be suggested below from time to time, this method of support is really palliative in nature; in the longer run we may hope for a developing awareness of the connection between our present difficulties in agricultural policy formulation and the shortcomings of some of our major political institutions.

Let us examine these points.

The Nature of Programmatic Research

Programmatic research assumes the continuing importance of governmental policies directed toward the amelioration of economic maladjustments in agriculture. Programmatic research asserts that better policies can emerge if based upon systematic inquiry and analysis. Yet programmatic research implies something more. For policies are directed towards ends—immediate and specific ends such as stabilizing particular prices, meeting special credit needs, and the like, but also more ultimate ends such as providing security, maintaining order, enlarging opportunity, enhancing production of goods and services, improving distribution, and retaining and strengthening the democratic process itself. Now in specific and immediate agricultural policy, there is very little hope that conservationists will be satisfied with the amount of conservation provided, or that in working toward future adjustments in production the principle of comparative advantage will receive full recognition, or that agricultural policy will be planned entirely in accordance with the criteria of nutritionists. On earth, at least, no sovereign reconciliation in which all ends are fully realized appears possible. Rather there must be compromise and reconciliation among various goals or ends. The process of compromise and the public acceptance of the result represent in themselves democratic ends. The same thing is true of the more ultimate purposes. Are we to strive for order without regard for justice; for security without regard for individual initiative? But here, even more than in the immediate goals, conflicting valuations are involved; and this is what makes programmatic research as difficult as it is necessary. Programmatic research cannot permit itself to be deterred because its findings challenge accepted valuations.

Nor does even this analysis probe all the difficulties of those who would dedicate themselves to programmatic research. For they must continually seek to find a harmony of interests and ends in which they can never permit themselves completely to believe. If they do not seek the harmony or, at least, the better reconciliation, then they must deny that there is a general welfare—and what then is left but to become the technicians for pressure groups?[4] But

[4] For an elaboration of the latter viewpoint in an earlier period, see John R. Commons, *Labor and Administration* (1913), Ch. V, *Economists and Class Partisanship*.

if they believe too strongly in the harmony, they risk becoming the advocates of panacea. How many useful ideas under certain times and conditions have been elevated to sacrosanct and sovereign remedies for all social ills! One thinks of the sub-treasury scheme, free coinage of silver, the protective tariff, McNary-Haugenism, Sapiro-ism, the single-tax, control of the "money power," and governmental fiscal policy. In politics, one could nominate direct democracy, proportional representation, and the "rule of law."[5] These considerations reveal the depths of our difficulties. Let us now attempt a brief statement of the attitude of a programmatic research worker.

He will view the continuation of a positive governmental policy in light of the multiplicity of ends which are sought through government. He will try to understand the relationships between valuations and ends as well as the conflicts among ends and among valuations. He will be on guard against panaceas. He will understand that the "general welfare" is easily invoked but difficult to define; yet as the end of governmental action he will insist upon postulating a general welfare the content of which is subject to continuous refinement. Realizing the dangers of an uncritical reliance upon reason, he will still assert that the power to think rationally is the chief characteristic of man. Finally in the light of such considerations, the programmatic research worker will be prepared to play his full share in the continuous search for better resolutions of the conflicting purposes of society through policies of government.

The Imperative of Programmatic Research

Is it possible to avoid controversy over the direction of agricultural policy by means of a general retreat from asking such leading questions as are posed, for example, in BAE's series, "What Peace Can Mean to the American Farmer"; by the series of Wartime Farm and Food Policy pamphlets, published at Iowa State College; or by the Report on Postwar Agricultural Policy of the Association of Land-Grand Colleges and Universities? I think not. The kind of agricultural policy we now have is *substantive*. By this I mean that prices may be fixed or supported, that quotas may be assigned, that government may step in directly to influence size of farms, types of farming, farming methods, and tenurial arrangements. Govern-

[5] On this whole discussion, see an extremely important recent book, Hans J. Morgenthau, *Scientific Man Versus Power Politics* (1946).

ment programs have already profoundly affected parts of the marketing system and much more may be expected in this field. The tendency seems to be for such substantive policy to become discrete for each important political commodity. The result may be politically introduced rigidity into an agricultural economy which otherwise would probably be characterized as much in the future as it has been historically by marked shifts in geographic locations of crops and enterprises and by great flexibility in emerging types of enterprise-combinations. Our effort to ameliorate through governmental action the human suffering occasioned in the past by such "flexibility" is laudable; but the actual policies and programs of amelioration also carry their own ill-effects, some of which I have attempted to analyze elsewhere.[6] Nor is this all. It may be difficult to balance the objectives of agricultural programs of the commodity-control type with other objectives such as conservation and land-tenure policy. Beyond this, major issues loom in resolving agricultural policy with fiscal policy, foreign policy, and population policy.

The operating commodity divisions may avoid much of the grief involved in the conflicting ends of substantive policies; it is difficult to see how agencies of general responsibility, such as BAE or the Land-Grant College Experiment Stations can do so. To take some examples.

(1) The parity index. Since parity is a ratio of prices received to prices paid designed to reflect a similar ratio which obtained in 1910–1914, questions arise chiefly as to the prices paid by farmers. What commodities or services shall be included, at what prices, and with what weights? Some believe the USDA has been scientifically objective in revising the index; others believe it has bowed to pressure; others find the revision policy fairly acceptable in the light of the political realities; and still others consider the present parity legislation so absurdly pseudo-scientific that trying to apply the scientific method to the parity index is like an effort statistically to determine how many angels can stand on a pin point. My only concern is to state that the parity index poses political questions which no agency charged with its manufacture and repair can avoid. The difficulties of the USDA rest only less lightly on the Experiment Stations whose economic staffs have a great responsibility for criti-

[6] Charles M. Hardin, "The Tobacco Program: Exception or Portent?", this JOURNAL, Nov., 1946.

cising agricultural price policies, of which the parity index is one aspect.

(2) Irrigation economics. Suppose a research organization is asked to produce some figures purporting to show how much money farmers can pay for irrigation. If the area concerned is borderline and the determinations are cognate to a decision as to whether legislative standards permit the development of an irrigation project, clearly the "scientifically objective determination" may become a hot potato. This may be much more true if an election approaches and the Congressional district is a "close" one.

(3) Farm incomes, from farming and from non-farm sources (such as off-farm work). Evidence has been introduced elsewhere to indicate that vigorous statistical research in this field may call forth charges of apostasy from the creed: "Our farmers, may they ever be right, but right or wrong—our farmers."[7]

(4) Distribution of income among farmers, especially if there were an effort to correlate such distribution with AAA payments (including parity payments), Commodity Credit Corporation loans, and the incidence of benefits from other farm programs.

(5) Studies to determine the physical labor in-put, for example, in the production of cotton.

(6) Actual recording of production and production trends—in short, crop reporting. If production goals are set, either to increase or to decrease production, a crop report which shows a figure divergent from the goals set may become a political item.

Many agricultural workers could extend the illustrations, but these are probably enough. They illustrate the weakness of "statistical innocence" as a defense. In the article just cited I attempted to show how "factual" inquiries into the distribution and derivation of farmers' incomes may involve a research agency in controversies over valuations bound up with "agricultural fundamentalism." The crucial point is that valuations as to what things ought to be are inextricably bound up with beliefs about what things are. Therefore, if one persists however chastely in "mere enumeration," he may find his project "exploding in his face" because his results challenge the facts upon which some emotion-laden valuation appears to rest.

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[7] Charles M. Hardin, "The Bureau of Agricultural Economics under Fire: A Study in Valuation Conflicts," this JOURNAL, August, 1946. A number of the points made here are further elaborated in that article.

My contention is, then, that social scientists, working in agriculture, are necessarily involved in policy questions—and let me say that their natural science brethren are equally caught in the same trap.[8] Here let us anticipate the question: What of it? Is it not preferable to be drafted rather than to volunteer; to wait for the push rather than leap into the breach? I think that there is much to be said for this point of view. Of late the centralization in agricultural government offers many examples of serene confidence in the efficacy of human reason—especially such reason as is ensconced in Washington. With this has often been linked a willingness to act, a desire to push programs, a propensity toward ever larger organizations—toward multiplication of functions and pyramiding appropriations or borrowing authority. The assurance with which administrators have accepted sweeping responsibility is a little breath-taking.

Against this reach of power there is a natural revulsion. There is skepticism as to human ability to perfect an ill-adjusted society through governmental means. There is suspicion that what is postulated to gain will be lost and what is set to avoid will be incurred.

Such sentiments deprecating man's ability to guide and even to control the powerful engines of government may militate against the acceptance of the "imperative of programmatic research." But so also may operate other factors: The ponderous inertia of large institutions against departing from settled ways; the inexorability for some of limited horizons; those minds which, faced with positive proposals, immediately canvass all the reasons for failure; and those possessors of security for whom the policies demanded by the insecure may seem outrageous or absurd.

If very recent history has demonstrated for many the possibility of excess in vigorous governmental policy, it can be strongly argued that the nature of what appears as excess in the '30's is partly attributable to an earlier inertia, a lethargy, a retreat from the challenge of the times.

All are familiar with the development of the triple-A: the effort to support prices via the Farm Board, the failure to support prices in the absence of production control, then production control and,

[8] A very large subject that needs searching analysis is the question of relating natural scientists to programmatic research. See Charles E. Kellogg, "Scientists and Social Policy in the Democratic State," *Scientific Monthly*, May–July, 1942. Most striking here, of course, is the interest of nuclear physicists in social policy.

subsequently, penalties for production in excess of quotas. Who will deny that we were plunged almost overnight into sweeping control programs without having laid the basis for their most rational operation through vigorous research in production economics? In 1933 our economic research energies had been focused for 20 years upon the market. The rush of activity which had followed the Purnell Act (1925) soon was pushed into traditional, "orthodox" lines. It is instructive to recall that the Federal Farm Board under Chairman Leggs rapidly came to the realization of the need for the most detailed kind of information on production economics, especially regarding the effect of comparative advantages. H. R. Tolley, then the head of the Gianinni Foundation, scathingly criticized the presumption that this kind of information could be evoked overnight.[9] But our present intent is merely to state the conclusion: The imperfect preparation in research inevitably contributed to the crudity of our production-control program. Furthermore, the crudities apparently tend to perpetuate themselves.

Research on Agricultural Policy in the U.S.D.A.

If the nature of present agricultural problems and policies requires continuous analysis of the kind with which the BAE was charged in 1938, what alternatives are there to BAE? Let us look first at the USDA, then at the Land-Grant Colleges. Not all the economic research in the Department has been in the BAE. FSA, Farm Credit Administration, SCS, AAA, and commodity branches in the Production and Marketing Administration have all carried on economic research and analyses on the basis of which program determinations have been made. Sometimes, not always, such research has been cooperative with BAE. As to whether other agencies in the Department can somehow manage to create methods of integrating research and analyses that will effectively replace the general work of the BAE, three points need to be made.

First, the Bureau of Agricultural Economics emerged into its 1938–1946 role only as the cumulation of a process that had long been going on in the agricultural sector of our central government. This process could be traced at least to the origin of BAE in 1922, and, indeed, to some of its precedent agencies which became in that

[9] Tolley was convinced, however, of the need for such information. See 44 *Proceedings of the Association of Land-Grant Colleges and Universities, 1930*, pp. 108 ff.

year its constituent parts; later, creation of the Federal Farm Board involved recruitment of an economic policy staff; later still the Agricultural Adjustment Administration was the setting for a Land Policy Committee; then the Office of Land Use Coordination was created; and finally BAE was cast in its role of policy analysis in 1938. The persistence of the creation of agencies for economic staffwork is certainly *prima facie* proof of the need for such agency.

Second, the operating bureaus and agencies, which parenthetically, will carry on considerable economic research and analysis regardless of such general organizations as BAE, can hardly be expected to carry the burden of jointly generalizing their rather disparate points of view and directions by means of "cooperation" without benefit of organized leadership. Yet conservation goals are certainly part of the ends of adjustment policy; at the same time, credit, the size of farms, tenure, and conservation are all closely interrelated. Their integration tends to be either with a commodity such as cotton (and perhaps with related industries; certainly with related producer-organizations), or with a function such as credit, or with a social purpose general in geographical extent but limited in scope—such as conservation. The consequence is that none of the operating bureaus and agencies is able to marshall all the intellectual resources of the USDA with respect to an adjustment problem (say in the Great Plains or in the Piedmont) where several commodities, several functions, and numerous social purposes are involved.

Third, in view of such considerations it is not surprising to find weighty professional testimony from experts in public administration that central organs of programmatic research and policy formulation are highly requisite.[10] Although a degree of self-determination is essential in operating bureaus, these tend to become nearly autonomous, so far as general departmental direction is concerned —a situation that, in large part, at least, is produced by that object of misplaced affections, our peculiar brand of the separation of powers. It becomes highly important, therefore, to strengthen the hand of the Secretary, just as, above the departmental level, it becomes essential to endow the President with effective organs and tools of inter-departmental coordination.

[10] Though many citations could be made, one of particular interest to agriculture will serve, John M. Gaus and Leon A. Wolcott, *Public Administration and the United States Department of Agriculture*, 1940, especially chapters 14, 15, and 17.

One point remains with respect to alternatives to the BAE in the role of over-all policy consideration within the Department—what of the Secretary's office itself? Here space requires that we substitute sentences for chapters. The Secretary's office has a range of responsibilities beyond the one under consideration. From within the Department decisions must be channeled to the Secretary (or his office) on personnel matters, financial control, the interpretation of departmental regulations and of statutes, quasilegal controversies placed by law in the hands of the Secretary, and the like. From outside the Department come communications and visitations—from the President's office, from Congress, from other Departments. Then there are always representatives of agricultural organizations and the gentlemen of the press.

No good reason appears to require that the economic investigation and advisory functions of the BAE be prosecuted in the Secretary's office. To be sure, if the Secretary is to be the responsible political chief of the Department in fact as well as in name, real authority over both the substance of programs and the structure of administration must reside in him. Here the argument touches several other questions in the field of agricultural politics. Political scientists will agree generally that the goal is to invest the Secretary with power commensurate with his responsibility; that the authority to make controlling decisions (always within the framework of delegations to him by Congress and the President, of course) should be his; and that he needs an adequate staff. But the research organization which will conduct continuous inquiry into the consequences of present policies and the shape of alternative possibilities probably ought to be separate from the Secretary, although subject to his general direction. The functions of programmatic research is not fit for a handful of trouble-shooters at the Secretary's elbow. Rather, a staff and facilities and time are required so that the product which emerges will bear some recognizable proportion to the eminence of the problems which research must attack—and so that the programmatic research agency may establish and maintain the necessary prestige in its field.

We conclude that a separate agency is advisable in the USDA for the purposes under review and that BAE has in the past been appropriately conceived for this general function. No effort is made here to weight BAE's performance in this role.

Why Programmatic Research in the Land-Grant Colleges?

But the USDA is not the whole of the agricultural governmental process in the United States. Are there alternatives to the BAE in the states, notably in the Land-Grant Colleges? Nowhere in this paper is the opinion expressed or implied that any organization should monopolize general research and policy formulation. Other agencies of the USDA share responsibilities in these fields as do universities generally, interest groups and foundations.[11]

May I here state another personal valuation? The Land-Grant Colleges ought to have and maintain a large role in general research bearing upon agricultural policy and in policy formulation. This valuation is related to a number of beliefs about related facts which can only be adumbrated; they concern, fundamentally, human nature—the limited scope of individuals as against the vastness of the problems, and the importance of competition among individuals in generating the best fruits of human initiative. They concern my fears of the consequences likely to proceed from the progressive governmentalizing of agricultural operations. In a country large as this, to draw into Washington all intellectual responsibility for research and planning with respect to agricultural policy seems absurd and dangerous. Absurd because of the infinitude of local differences that need to be reflected in policies appropriately adapted (and many people can offer examples of Washington programs which have come out cut-and-dried to do violence to the necessity for nice local adaptation). Dangerous because of the tendency of central agencies toward orthodoxy: here I am reminded of the late Joseph Storm's explanation of his transfer in 1941 from information officer of the AAA to information officer for the Department of Agriculture (i.e., for Secretary Wickard). "Gentlemen (he said, in effect, to the gathered Department and college workers) we have subscribed to different orthodoxies. There have been the Gospel according to St. Hugh, the Gospel according to St. Beany, and the Gospel according to St. Spike. But from now on, Gentlemen, there is just one Gospel—according to St. Claude."[12]

[11] The LGCA statement, *op. cit.*, remarked: "The national farm organizations have a few research economists, but the officers of these organizations have repeatedly emphasized the need for more economic research than the State experiment stations and the United States Department of Agriculture have been able to undertake." With due credit to the work performed by research staffs of farm organizations, it is clear that programmatic research must be institutionalized elsewhere.

[12] References were to Hugh Hammond Bennett, Chief, Soil Conservation Service; C. B. ("Beany") Baldwin, then Administrator, Farm Security Administration; and R. M. ("Spike") Evans, then Administrator, Agricultural Adjustment Administration.

We may expect well-financed action programs in agriculture, backed by virile pressure groups closely intertwined with powerful Congressmen; these programs will be administered by strong agencies. And out of each complex, or "whirlpool of policy" (in Galloway's phrase), there emerges an orthodoxy, an agency line. *And the resultant pressures upon research to emanate in conclusions which support the agency line can be enormous.*

From such beliefs as these about the facts of economic politics my conclusion, or evaluation, arises: that we should by all means maintain vigorous, quite independent centers of research and policy-formulation and criticism in our Land-Grand Colleges. One of the characteristics of constitutional democracy is that the means of generating alternative policies to those at any time obtaining are institutionalized. It is the virtue of the federal system to provide, as in the Land-Grant Colleges, a forum for men to rise and address the central government, echoing Cromwell's phrase: "I beseech you, in the bowels of Christ, think it possible that you may be mistaken."[13]

Handicaps of the Colleges

From this valuation one could turn with great interest to an exhaustive study of the work of the State Experiment Stations of Land-Grant Colleges over the last twenty years to estimate its relevance to policy formulation. That task is as much beyond our present paper as was a similar inquiry into the substance of what BAE has done. Parenthetically, the task of examining 5000 projects and as many researchers would be formidable; nor are there published analyses which are greatly helpful—at least since (roughly) 1930. Before 1930 there was continuous cross-fire of self-criticism among Land-Grant research workers, since then, understandably but sadly, there has been a lack of critical appraisal. Before 1930 the Washington Office of Experiment Stations was capable of resounding critical broadsides against what it conceived as state station shortcomings. Since 1930 Washington strictures have been notably absent.

What we may do, however, is to suggest reasons which indicate that, however important the various state experiment station's *share* in general research and program formulation ought to be, their pre-emption of the entire field is neither anticipated nor desirable.

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[13] Quoted in W. Ivor Jennings, *The British Constitution*, 1942, p. 77.

Historically, although brilliant exceptions can be cited to the contrary, Land-Grant Colleges for a variety of reasons have been handicapped in addressing themselves to national and, frequently, even to regional problems. Primary responsibilities of these colleges are to issues arising and demands made from within their several states. The colleges are state institutions. Moreover, each college is a tough institution, directed by men who understand politics as "the art of the possible." Each college has had its fighting background, its heroic period when the alternatives seemed to the college champions (and rightly in the view of their inheritors today) to have been meanness, mediocrity, or eminence. College prestige and reputation, not lightly won, are never lightly worn.

The effects upon the attitudes and expectations of college men are profound. Many of the men who hammer out their careers in such institutions were born in the same state that educated them and now provides the college field for their initiative. Their highest professional ambitions culminate within the boundaries of the same institutions which they first approached as freshmen. The powerful centripetal consequences are further abetted by the frequent close relationships with farmer organizations which are also organized upon state lines within which they largely work out their purposes. In this fashion do the institutions that flesh out the federal theory act to strengthen each other in the illusion of self-sufficiency and independence.[14]

As state institutions, the colleges are expected to serve the public of their own states—but what is the "public"? Many political scientists and philosophers have helped us understand that for practical purposes, there are often many publics. The constituent group, the determining group, the decisive group of each college must be discovered in separate, often intricate, analysis. The state legislature, as a whole, will be important—a matter of general knowledge to which one of Missouri University's great presidents, Richard Henry Jesse, gave classical expression.[15] But behind the legislature are alumni groups and, among other organizations, those of the farmers. Equally classic is the manner in which Dean Davenport of the University of Illinois obtained the first substantial state appropriation for the college experiment station.[16]

[14] As indicated below, I am aware that there are also centrifugal tendencies at work arising from the nature of colleges as institutions with universal outlook.

[15] Jonas Viles, *A History of the University of Missouri*, p. 230.

[16] See Allan Nevins, *Illinois*, p. 196; Dean H. W. Mumford in 40 *Proceedings* of the Association of Land-Grant Colleges and Universities (1926), pp. 212–15.

What is the meaning of this proximity of organized farmer-interest to the Experiment Stations? Are there discernible effects upon Station programs? I should be among the last generally to decry the face-to-face relationships of researchers and agricultural college people with the farmers and farm leaders of their states. But our concern is to examine the college's ability to direct programmatic research; such close relations may seriously inhibit the experiment stations in its prosecution.

Permit me to offer three examples. In all of them, the vulnerability of the college to its particular "public" seems of paramount importance. The effect may be one of surface amity bought at the price of accepting conditions as they are. When such acceptance becomes transmuted into conviction, an intellectual proposition which once was challengeable as such becomes a shibboleth. Thus in certain states college people have declared to me that the distribution of farm property and income is too hot to handle. Yet the operation of the AAA was admittedly making the differences even greater. A personal escape from the psychological tensions arising from this situation is for the research worker to embrace the belief that people are divided by nature into two classes: Those who will make out all right barring the "slings and arrows of outrageous fortune" and those who are just no 'count. Or the effect may be openly political. The significant recent example is the Iowa State margarine imbroglio of 1943. Without attempting to fix praise or blame in this deep-rooted situation, one can say that there was pressure of political nature (politics does not have to be partisan) and that, later, there was a great exodus of professional personnel from Ames. In consequence of this exodus one of the social science teams in the Land-Grant College area which was addressing itself consistently to agricultural policy in its general setting was disrupted. Finally there is an entirely different kind of pressure the effect of which may be equally debilitating. State experiment stations are constantly importuned for the answers to very specific questions to practical problems of immediate interest to farmers. Thus the conception and prosecution (especially the latter) of a broad-scale and long-run program is difficult—as the Congressional testimony of the Washington spokesman of the stations, Director Jardine of the federal Office of Experiment Station, year after year bears witness.[17]

[17] To this incessant pressure for "practical" research on unrelated problems one must add the tendency toward specialization in Land-Grant as well as other colleges. Experiment stations are normally divided into numerous departments which

In consequence the colleges are hardly in position to furnish the sole leadership for programmatic research in agriculture. Nothing is implied in depreciation of the ability of college men to lead in this field. The list of cooperative, Washington-state projects is impressive. But the point is that leadership must come from both sides; stimulation must come from both sides; criticism likewise. The inability of the colleges to get together in joint research without help from Washington was abundantly testified in the 1920's. After a decade of self-criticism by such men as A. R. Mann, C. E. Ladd, Mumford of Missouri, Webber of California, and Farrel of Kansas —after, too, a decade of McNary-Haugenism and kindred agitation, the Experiment Stations were circularized in the 1930 Survey[18] as to the relative importance of various items in their station programs. Blandly, the Survey recorded that most institutions placed joint research with other stations and the USDA on common general problems *at the bottom of the list!*

To some extent, the states lost the agricultural leadership to the New Deal by default.

The New Deal and the Process of Centralization

The depression brought to fruition the ideal of McNary-Haugenism, national agricultural programs of price supports. The Agricultural Adjustment Administration was perforce a large Washington agency from its inception. The Land-Grant Colleges were very much partners of the initial effort. But these colleges had kept their Washington counterparts, the Federal Office of Experiment Stations and the Extension Service, safely anemic. Now the colleges were faced with a large, rapidly-growing heavily-financed Washington line agency, the AAA, which soon (1936) divorced itself from the Land-Grant Colleges and operated through its own network of committees directly with cooperating farmers.[19] Chester C. Davis

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apparently are not well organized administratively to produce joint research programs. Now it may be argued that here the cure is entirely intra-state, but I believe that well-organized general research at Washington would help the states break down their departmental fences—just as a similar reciprocal effect should help those in Washington to make the interbureau coordinating committee a real coordinating device instead of a meeting of "ambassadors" each determined to get his agency's point of view fully represented in a kind of treaty.

[18] *Survey of Land-Grant Colleges and Universities*, Office of Education, U.S.D.I., Bull. No. 9, 1930, Vol. II, pp. 666–67.

[19] Developments in the South were somewhat different; there if the divorce was decreed, the parties continued to live together.

retired from leadership of the AAA at about the time that this move became incipient. He later declared that some members of a Washington group, in disregard of the position of the Land-Grant Colleges, were building a powerful centralized agency which they might seek to use for political purposes.[20] H. R. Tolley became AAA chief in 1936; he was succeeded by R. M. "Spike" Evans in 1938. In 1943 friction had increased to warfare, the AAA versus the Farm Bureau and the Colleges throughout much of the Corn Belt. Then War Food Administration was created and Chester Davis returned as its head. He discharged Harry Schooler and otherwise acted to break up what he considered to be a politically-minded group in the AAA leadership in Washington. Then he called a meeting of state college leaders; one of whom told me soon afterward that this was the first time in five years that state college officials had been called for formal consultation on the farm program.

The Quandary of the Land-Grant Colleges

If the Land-Grant Colleges were eased out of policy considerations at one time, they surely have at least a foot in the door today. But do they want it there? Early in the 1930's there was what appears in retrospect a movement of some promise. A conference on land-use was held at the University of Chicago immediately after the annual meeting of the Land-Grant College Association. Out of the conference came a joint federal-state committee on land-use policy. But with the New Deal and the creation of the National Resources Board, this joint committee was discontinued and the Land-Grant Colleges created their own committee which fell into disuse except as a limited forum for carping at federal encroachment. So passed a joint committee which it is *barely possible* (using these words advisedly) might have grown into an agency of considerable benefit to these United States.

Why did the colleges let the joint committee die?[21] Immediate issues were pressing. The colleges separately were beset by depression-engendered attacks of economy-minded state legislatures; collectively, by economy drives developed in the Hoover administration against federal grants-in-aid and vigorously carried on by

[20] Interview, September, 1943. Others have ascribed Davis's move to different reasons, at least in part. See John D. Black, this JOURNAL, Aug., 1946.

[21] Assuming that at this late date they could have insisted on the retention of the joint approach,

F. D. Roosevelt's first budget-director, Mr. Lewis W. Douglas. The colleges and the LGCA hence retreated into their familiar and successful role of expert political activity on behalf of narrow and immediate interests. No time now, when time was most needed, for general considerations of agricultural policy.[22]

But there was and is another reason for failure of full college participation in policy formulation: the colleges are diffident. College officials deprecate action programs in part because of their strong belief in the efficacy of research, education, and extension as representing the true means for solving social maladjustments. In addition, college men are aware that any positive governmental program is almost inevitably identified with the political party in power. Particularly in the midwest and other sections where party loyalty has been traditionally Republican (if sometimes of a radical variety!), college officials are inclined toward a profound skepticism with regard to "new deal" programs for agriculture. Hence ideology and interest have coincided, to a degree, to counsel policies of watchful waiting toward new-fangled programs. But, to a degree, ideology and interest have also counseled just the opposite; ideologically for some aspects, at least, of the farm programs were intellectual; and were not the colleges to have or share the leadership in these intellectual aspects (i.e., the research and education)? And as for interest—no one really presumes that the farm programs came elsewhere than from the demands of those same farmers who are also constituents of the colleges.

Here was a real quandary. Colleges have earnestly sought the answer to what their role should be with respect to federal action programs. One significant analysis was made by Iowa State College in 1939.[23] The issue was recognized as a "matter of great delicacy." The college could not be pushed into administering action programs; on the other hand, it should be at least full partner in research and education. The principle, like so many in politics, is easy to state but hard to apply; for research and formulation of results therefrom are intimately related to action programs and

[22] One must realize the strong historical predilection of the college leaders to refrain from advising on agricultural policy. This predilection has been often evidenced; and only recently, with the creation of the Agricultural Policy Committee of the LGCA, as well as the re-orientation of its Executive Committee, is there indication that the colleges jointly are willing to move toward a more positive role.

[23] "Federal State relations in Agriculture," Parts I and II, Bulletins of Iowa State College, Vol. 38, Numbers 2 and 28 (1938 and 1939).

their administration; hence to "politics." The Iowa State group, declaring that the colleges must abjure actual fixing of quotas or prices, urged that they must accept, indeed, insist upon, full participation in "general administrative planning." However, "It is the area between that is difficult of delineation." Good as the Iowa analysis is, the formula which it offers is admittedly very broad. Indeed this formula would seem to be acceptable to all but the most unreconstructed states righters, on the one hand, and sufficient to all but a very limited few who are willing for the colleges to take over direct administration.

Consequently, the question emerges as to whether we can stop with our present institutions as given and search for diplomatic formulas or whether we need actually to create new institutions which will smooth the road to fuller federal-state collaboration in agricultural program formulation. It is my profound conviction that we need a better institutional arrangement than is presently ours.

But the thesis of this paper is somewhat narrower: *Whereas general agricultural research and policy formation is necessary, I hold that it cannot be as successfully prosecuted either by the central government or the states alone as by both of them together.*[24]

What Can Be Done Immediately

The first thing is to debate the issues.[25] Let me restate again my definition in terms of the attitude of the programmatic research worker.

He will view the continuation of positive governmental policy in light of the multiplicity of ends which are sought through government. He will try to understand the relationships between valuations and ends as well as conflicts among ends and among valuations. He will be on guard against panaceas. He will understand that the "general welfare"

[24] Emphasis in this paper upon the traditional partners of the federal system, the federal government and the states, should not be permitted to obscure the importance of the question as to whether programmatic research ought also to be organized regionally, and if so, for what purposes and, in what manner of cooperative sharing between Washington and the states concerned. Answers to these controversial questions require a searching analysis which gets down into the significant details of the experience which we have had with regional offices before any generalizations are attempted.

[25] We need a better forum for debating agricultural policy. Why cannot agriculture generally have a journal of policy, similar in scope and intent to the *Journal of Forestry*? The debate should be available to administrators, educators, physical, and social scientists—on both sides of the federal-state system. The editorial board might be broadly representative.

is easily invoked but difficult to define; yet as the end of governmental action he will insist upon postulating a general welfare the content of which is subject to continuous refinement. Realizing the dangers of an uncritical reliance upon reason, he will still assert that the power to think rationally is the chief characteristic of man. Finally, in the light of such considerations, the programmatic research worker will be prepared to play his full share in the continuous search for better resolutions of the conflicting purposes of society through policies of government.

This concept many will be unable to swallow. I have arrived at it largely, I think, through being a student of government. The concept is not advanced in the thought that it will be accepted lightly; indeed, it cannot be so accepted. Perhaps the "will *not* to believe" too strongly in concrete proposals (or "alternatives") is psychologically absurd. The "general welfare" pictures may be too attenuated for some; others will deny that any concept of the general welfare can have meaning. Nevertheless, assuming that the general definition of programmatic research represents something desirable to achieve, how can this be done?

The second thing is to consider short run steps. In the USDA an agency would be established with the responsibility of programmatic research. Whether this agency would be the BAE is not so important as the clarity of both responsibility and authorization for research which does not shirk issues because valuations are involved and which recognizes the degree of reconciliation necessary among the ends of policy. That the final reconciliation among such ends is, and should remain, the task of the politician ought not excuse research workers from the duty of showing all the technical aspects which bear on the reconciliation. It is equally important that the agency of programmatic research develop methods and personnel adequate for integrating all the relevant professional agricultural disciplines—as has been done notably in "Peacetime Adjustments in Farming; Possibilities under Prosperity Conditions."[26]

By the same token, the Land-Grant Colleges have an equal responsibility for general orientation. Just as there are compelling drives to confine the attention and expectations of college men, as though drawn by some spiritual lodestar within their own states, there are also centrifugal forces. For colleges are really universities

[26] Prepared by the Interbureau Committee on Postwar Programs in cooperation with the Land-Grant Colleges, Misc. Publ., USDA, No. 595 (1945).

and the outlook of a university is universal. Think of the scores of Land-Grant College men who have bestridden the limits of their disciplines without regard to geographic boundaries. Moreover, in most states, several programs of the Department come together; the colleges have a practical interest in their resolution.

This general orientation may call for some internal reorganization within the colleges. For example, how many college experiment stations today make use of the annual budget as a device for bringing all department heads together to appraise both short-run and long-run general research goals and the relevance of current projects thereto?

Externally, it means vigorous support of programmatic research in the USDA. The LGCA statement declared:

> "Clearly the public welfare requires that agricultural economic research at the Federal level be centered in the Bureau of Agricultural Economics."

Many of the colleges will privately consider the degree of support implicit in this statement as outlandish. Moreover, such support goes much further than the colleges or the LGCA have historically evinced the willingness to go. But the need for programmatic research in the USDA is clarified for the colleges by citing the importance of mutual interaction; if both the Department and the colleges operate vigorously in this field it is quite likely that it will be easier for each of them to do so.

In supporting programmatic research in the USDA, the colleges should maintain the position that this is the limit of their insistence. The colleges and the LGCA need not and must not be placed in the position of necessarily espousing any particular policy which emanates from Washington; indeed, I have repeatedly argued that the colleges must maintain their independence as potential critics of whatever analyses emerge from the very federal agency whose existence and purpose they ought to support!

Finally, there are real possibilities in the short run with institutions as they are for the colleges to support each other and the USDA in programmatic research. In our federal system, we have not only the federal government and the states but also an interstate association which is neither national nor state. For our purposes, this is the Association of Land-Grant Colleges and Universities. While lack of space prevents full elaboration here, numerous conversations with college officials in 1943 convinced me that the

outlook is bright to create a "resistance function" within the LGCA to counteract the pressures within any particular state against programmatic research and, at the same time, to further such research in the USDA.

The Significance of the Longer Run

The turn the argument must take at this point is what convinces me that my positive suggestions are, at best, palliatives. For the real objection of the colleges is based on the widespread conviction that so-called "objective research workers" in federal agencies are few and uninfluential. College leaders suspect that the tenor of research and program formulation in the USDA is too much influenced by political considerations.

I do not wish to minimize the difficulties here. Some of them are inherent in the nature of politics. Yet improvement in mutual regard across the federal-state hiatus ought to be possible. The colleges have an honest complaint against the USDA table-thumpers, the impatient reformers, and the men who arrogantly assume that all real intellectual ability gravitates into Washington. But the USDA has no monopoly on characteristics of invidious prestige. I have seen in the colleges a critical scrutiny of Washington mannerisms which worked to cheapen the dignity of the college itself. And consider that lovely word "cooperation." For how many state station and extension workers does it really mean, "We operate and you coo?"

It is doubtful, however, that improving human relations will suffice to ameliorate the federal-state differences which arise from the creaks and jars of political institutions which are inadequate to our present needs. I believe that Washington professional workers, in agriculture as elsewhere, are led much further into partisanship than they would be if our national political parties were strong enough to perform general functions of policy-making and policy defense.

Two developments bear out and explain this point. They can only be sketched here. The first development involves the weakness of our party system. We profoundly need strong national political parties which can discipline their elected candidates to support party programs. There is nothing "totalitarian" in this, provided that there remains one (and preferably only one) major opposition party. Quite the contrary of totalitarianism, it is difficult

to see how government can be made responsible to the electorate in the absence of strong parties. Our economy becomes more clearly a national one (with international implications); national defense becomes clarified as a pressing and permanent issue for all of us; problems in the field of labor, agriculture, natural resources, transportation, education, health, and population begin to appear as national issues—yet with all this, our political parties remain "loose federations of state machines." Our parties lack within their own organizations the means of controlling their own Congressmen; hence there has been evidence that means of control have sometimes been sought through the use of governmental agencies, which ought to be strictly neutral politically, to partisan ends. Behind this development has been, I think, not merely patronage hunger, but a groping for a means to make parties truly national. Yet what happens smells of spoils politics to the observer. If this observer happens to be an influential Land Grant College Official and if what he observes happens to be political activity in a Washington agricultural agency, he is likely to impute what he has seen on the part of individuals to Washington workers generally. The attitude of such college official may be further influenced against Washington administrative partisanship by deep convictions of his own that "politics is a rotten business anyway." In the context of this paper, I interpret the development of administrative partisanship as one which aggravates the relationships between the federal government and the states. In a larger context, I plead that college people should look behind the irritating and distasteful surface manifestations of administrative partisanship to the shortcomings of some of our major political institutions. To repeat, I believe that some Washington professional workers, in agriculture as elsewhere, have been led much further into partisanship than they would have been if our national political parties had been strong enough to perform general functions of policy-making and policy defense.

But other organizations and processes of government than party organization and procedures are involved. This leads to the second development which tends to worsen federal-state relationships. In the absence of party discipline, the Congress tends to break up into little centers of strategic influence. An ideal situation develops for the successful operation of pressure groups. Governmental agencies are created to advance various special interests. These agencies have to return to Congress—really, very often, to their particular

groups of strategic Congressmen—for annual appropriations. As a result, "whirlpools of policy" develop—including interest-group leaders, administrators, and strategic Congressmen. In consequence a splintering occurs—a splintering of agricultural programs, for example, into agencies, branches, divisions, services, or authorities. The Land-Grant College, therefore, finds itself dealing with numerous separate—and somewhat autonomous—agencies, each striving through loyal personnel for a place in the sun.

There develops a continuous *melee* in which participants jockey for advantage, a series of memoranda of understandings which have the defects of treaties generally, and numerous, separate skirmishes on the adjustment, credit, conservation (and other) fronts. It is difficult enough in the face of intra-state issues and pressures for the colleges to maintain their integration and a programmatic approach; it is overwhelmingly so in face of splintered policies, programs, and administrations emanating from Washington.

All this is germane to the orientation of this paper, for both in the shorter run and the years ahead, political institutions are on the agenda of programmatic research. We have by no means fully explored the possibilities of the federal system; but as the exploration proceeds it will draw our inquiry toward other political institutions and principles—chiefly the party structure and the separation of powers. Until the political parties can accept that programmatic responsibility which is the counterpart of the agricultural scientist's programmatic research, the natural friction between federal professional workers in agriculture and state professional workers will be aggravated.

But these are long-run tasks. Let us hope that this aggravation does not prevent the taking of immediately feasible action in mutual interests. Economically, technologically, politically, culturally —in all these the secular trend is toward centralization. Against the possibility that the trend may overreach itself in creating irresponsive central agencies, the maintenance of a vigorous federal-state system is a valuable safeguard. I hope that this paper conveys my conviction that the maintenance of such system depends upon the vigilant support of strong programmatic research agencies both centrally and in the states.

FARM PRICE GYRATIONS—AN AGGREGATIVE HYPOTHESIS

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I

WHY does agriculture appear chronically to be in a state of unbalance? Why in the field of agriculture do we seem to oscillate between two extremes—surplus and shortage?[1] The answer would seem to be tied up with the unresponsiveness of agricultural output to price changes. For, although total agricultural output has increased steadily over the past 50 years, the year to year fluctuations have been small. It is a rare year indeed when the index of agricultural production fluctuates by more than 10 points, but the year is even more difficult to find when the index of industrial production does not fluctuate by more than 10 points, and more often by 30 to 40 points.[2]

Once we perceive the *short run tendency* in agriculture for aggregate output to remain fixed, we are in a position to give some answers as to why a modest shift in aggregate demand creates either a condition of surplus or shortage, depending on the nature of the shift—and to draw the important corollary that a small increase in total demand will correct a surplus condition and a small decrease in demand will correct a shortage condition. This is not to argue that all aspects of the surplus-shortage problem in agriculture can be explained by the unresponsiveness of aggregate output. It is simply to say that when we relate output in the aggregate to overall demand we come to grips with a problem that is not clearly evident

* The views expressed here do not necessarily represent the views of the Bureau of Agricultural Economics or the Department of Agriculture; they are the responsibility of the author alone. The author, however, wishes to take this opportunity to thank Robert H. Masucci for his assistance with several elusive concepts, and to acknowledge the helpful suggestions and criticisms received from Rex F. Daly, Winn Finner, J. P. Cavin, F. V. Waugh, Sherman Johnson, Bushrod W. Allin, and James G. Maddox in the preparation of this paper.

[1] A surplus may be defined as follows: (1) With flexible prices, a situation wherein an extreme price decline fails to stimulate a reduction in the supply offered and force prices upward once again; (2) with fixed or supported prices, a situation wherein supplies fail to clear the market at the fixed prices; a shortage condition is, of course, the converse of that just described.

[2] Harold Barger, and Hans H. Landsberg, *American Agriculture 1899–1939. A Study of Output, Employment and Productivity.* National Bureau of Economic Research, Inc. 1942. Chapter II.

when we look at individual commodities—*the problem of general agricultural price swings*. For many, if not most, agricultural commodity prices move up and down together, and in wide fluctuations and thus violently influence the returns to farming.

The logic of treating agricultural output (or food output as in the empirical analysis) in the aggregate is that there is a high degree of substitution between individual farm enterprises in most areas and at the extensive margin of all areas in response to commodity price changes, but not between farm and nonfarm enterprises. For example, farmers shift readily between potatoes and sugar beets, corn and hogs, but not between farming and banking or farming and manufacturing. On the demand side too, particularly in the case of foods, consumers are continuously substituting less expensive items for more expensive items. Thus, through the ever-operating process of substitution, prices of individual agricultural commodities hold their relative positions with some precision even though the level of all agricultural prices may be shifting radically.

The agricultural commodity price level does not move in close harmony with the nonagricultural price level for the very reason that the process of substitution, both on the production side and on the consumption side, breaks down or is severely restricted as between the agricultural and nonagricultural segments of the economy. To an important degree agriculture represents a water-tight compartment within which there is considerable fluidity, but the connective valve between the agricultural compartment and the rest of the economy works poorly and sometimes almost not at all.

In sum then, there is an economic justification for an aggregative analysis of which the unit of analysis is total agricultural output. Hence, we shall now attempt an explanation of price behavior in agriculture by relating overall demand to the total product of the water-tight compartment.

II

Our hypothesis is, it is hoped, somewhat novel, but it is not overly complex if the reader can free himself from the static Marshallian cross. The aggregate output curve for agriculture is exceedingly inelastic for any given period and given productive organization. That much seems evident. The peculiar unity of occupational functions (labor, technological and business management), the fixity of the labor supply, and the importances of overhead costs as com-

pared with operating costs on family farms,[3] argue for the plausibility of an inelastic aggregate output curve.

In this connection the term *output curve* is used advisedly, for the concept involved is not the instantaneous supply schedule of Alfred Marshall[4] or the record of successive price equilibria (trend line) of Norman Silberling.[5] We have in mind an obvious concept—the size of the total product which farmers in the aggregate will produce at varying levels of price in any given year. Thus, the aggregate output curve under consideration is, in an orthodox fashion, a function of price. But since agricultural output can emerge only through time, farmers cannot stand ready to produce instantaneously varying quantities of product at different levels of price. A farm output schedule conceptually comparable to the supply schedule of traders, who may at any instant of time, stand ready to sell varying quantities of product at different prices, is inappropriate here. But a schedule of intentions to produce—the product that farmers in the aggregate plan to produce at varying levels of price—is conceptually possible. In other words, an output function in a schedule sense can exist only in the planning phase of the production process when farmers are deciding how much to try to produce. Therefore we define the output function in terms of this schedule of intentions to produce (this postulated inelastic schedule is shown graphically as curve II in fig. 1, chart A).

The aggregate demand function (DD in fig. 1, chart A) is also distinctly inelastic in slope, but not as severely so as the output curve. And it is conventional in all respects. But the introduction of a schedule of intentions to produce raises the problem, among many others, of time sequences in the demand, price and output relationship. The demand function cannot be related to a schedule of intentions to produce—such a relationship has no meaning, for buyers are seeking goods not intentions. Thus, the demand function assumes a meaningful role in this context only when related to *realized output*. The schedule of intentions to produce is a function of price, but a definite price solution results only after the production process is complete and the bargaining over a real basket of goods yields

[3] These ideas are developed fully by John Brewster and Howard Parsons in their recent article "Can Prices Allocate Resources in American Agriculture?" This JOURNAL, November, 1946.

[4] *Principles of Economics*, 8th edition, p. 344.

[5] "Graphic Illustration of the Laws of Price," *American Economic Review*, September, 1924, pp. 431–442.

a unique price (price level in this case). Step by step, then, our conceptual framework leads us into the familiar cobweb theorem type of analysis[6] developed by Mordecai Ezekiel some years ago. But since our analysis differs somewhat from the Ezekiel models, and we have a particular interest in the slope and position of the curves involved, it seems necessary to chase ourselves around the cobweb a brief time or two.

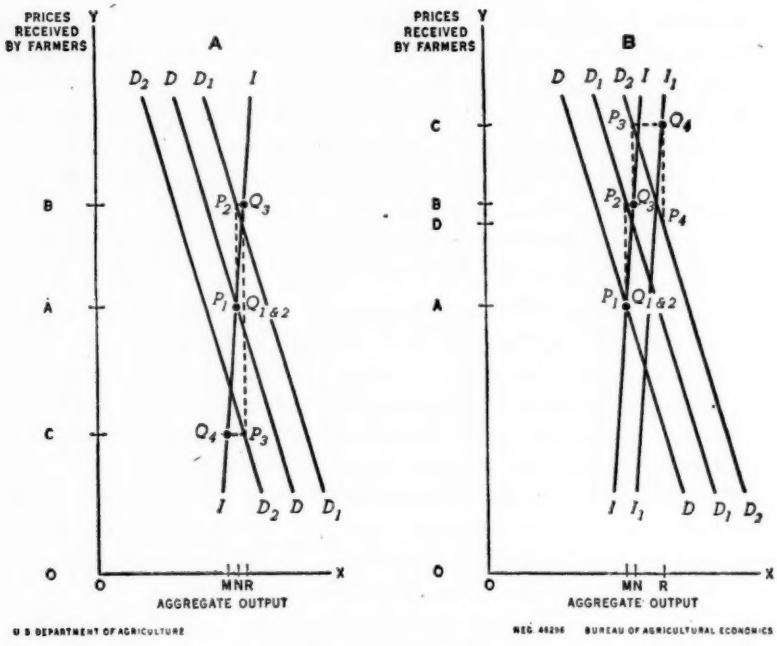

FIG. 1. A working hypothesis regarding the *slope* and *relationship* of the aggregate demand curve to the aggregate output curve.

Given to the analysis is a positionally fixed and inelastic schedule of intentions to produce II in fig. 1, chart A, and a realized output Q_1 (ON amount) falling exactly on the schedule of intentions in crop year 1. Also, we must take as given, in order to break into an endless stimulus and response sequence, an aggregate demand curve DD for crop year 1. Since demand equals realized output in crop year 1, a price P_1 (OA value) results. And price P_1 induces farmers

[6] *Quarterly Journal of Economics*, February 1938, pp. 255–280.

in the aggregate to plan to produce a product Q_2 in crop year 2 or (ON amount once again). It is assumed, further, to simplify the analysis, that farmers' intentions are exactly realized and Q_2 product (ON amount) is forthcoming in crop year 2.[7] But within the interval of time required in the production process between the planning phase and harvesting for sale phase, demand shifts to D_1D_1. The realized product Q_2 sells at P_2 price (OB value) as indicated on demand curve D_1D_1. The P_2 price then induces farmers in the aggregate to try to produce Q_3 product (OR amount) in crop year 3. Once again it is assumed that production plans are exactly realized and Q_3 product is forthcoming in crop year 3. But within the time interval required by the production process aggregate demand has contracted to D_2D_2, so Q_3 product sells for P_3 price (OC value) in crop year 3, thereby inducing farmers to try to produce Q_4 product in crop year 4. And so it goes.

Conceptually then, it is the movement of a severely inelastic demand curve indirectly along (through the vehicle of a time sequence) an even more inelastic and *fixed* schedule of intentions to produce that determines (1) the price level at which the total product of agriculture moves and (2) the total amount of product that will move. And significant for this analysis, the slope of the two curves and their relationship through time results in an almost infinitesimal quantity response and a violent price response to any given change in demand.

But the proposition that the aggregate output function is positionally fixed requires some further explanation, for it is an historical fact that the total output from the national agricultural plant has trended upward over the years. According to our hypothesis the position of the output curve is not completely independent of demand, but is, under certain conditions, related to the movement of demand. To take a special but important case, if for any reason total demand should expand (the demand curve shifts to the right) in a period in which new technologies of production are seriously modifying the production process—forcing a reorganization in the production process—we then obtain a result fundamentally different from that outlined above. *The schedule of intentions to produce,*

[7] It is recognized, of course, that realized output will vary to some extent from the theoretical quantity. All manner of institutional and physical influences (e.g. droughts, bountiful weather, a trucking strike, a miraculous innovation) operate continuously to force realized output away from planned output.

itself, shifts to the right with the expansion in demand (see fig. 1, chart B).

The stimulus-response sequence (planning phase, movement in demand, realization of output, price determination, planning phase again) is the same in chart B as in A through the planning phase of crop year 3. But between the planning phase and the realization of those plans in crop year 3, aggregate demand expands to D_2D_2. Consequently the realized output sells at P_3 price (OC value). This P_3 price experienced during the formative period of intentions induces farmers in the aggregate to invest heavily in machinery and equipment. And heavy investments in new and more efficient machinery expand the capacity to produce—hence, shift the schedule of intentions to produce to the right. Continuing the sequential analysis, farmers in the aggregate plan to produce Q_4 product located on the new and more productive schedule of intentions to produce (I_1I_1). If demand holds constant at D_2D_2, the Q_4 product (OR amount) will sell at the reduced price P_4 (OD value). But should the total demand for farm products continue to expand in this context of developing technologies, the aggregate output curve may continue to drift to the right, taking up successively new and more productive positions.

The logic of the shift to the right in the position of the aggregate output function in response to an increase in demand is evident if we reflect for a moment on the relationship of technological change and the introduction of innovations to demand and price conditions. In the first place, the output curve shifts to the right as output per unit of input increases. And the output per unit of input usually increases as new technologies are incorporated into the production process. But if demand is not expanding—that is, if the curve DD is not shifting to the right thus creating a favorable economic milieu—most farmers would not have (1) the optimistic price expectations and (2) the financial resources to introduce labor saving or capital saving innovations into their farming operations even though the introduction of those innovations would reduce unit costs in any period. Farmers, like other businessmen, tend not to make net investments in machinery and equipment when their outlook is dampened by currently depressed prices and their sources of credit are restricted; they tend to invest when the future looks bright and credit is easy.

In a period of stationary or contracting demand "know how"

and enhanced physical productive capacity accumulate, so to speak, in an unused pool. Now given an expansion in demand, output increases as known technologies are put into practice, with the result that the aggregate output curve jumps to the right or drifts to the right through a succession of temporary positions, taking up a new fixed position defined by a new productive organization centered around the technologies recently placed in operation. But once the pool of unused technologies are incorporated into the production organization, limited always by the labor force on family farms, further increases in demand fail to increase productivity—shift the output curve further to the right. Further increases in demand simply develop a stimulus-response sequence centered around the inelastic output curve (I_1I_1 in fig. 1, chart B) yielding substantially higher prices and inconsequential quantity increases. In general terms then, an increase in demand may, in one phase, increase price and not output, and, in another phase, may increase output and not price.

The skipping action described above, however, is not readily reversible. If, for example, the aggregate demand curve DD moves sufficiently to the right in the necessary technological context to cause the output curve to also shift to the right, the output curve does not shift back to the left with a contraction in demand. The demand curve will rather initiate a stimulus-response sequence centered around the output curve I_1I_1 wherein prices fall precipitously and quantity changes almost not at all. For the behavior of aggregate output in the field of agriculture following a general price decline is not one of contraction. On the contrary, it is one of sustained output. Once the output function (schedule of intentions to produce) has shifted to the right, it remains fixed in that inelastic position until some new demand stimulus causes it once again to shift to the right.

But to return to the central argument, given a severely inelastic demand curve for the total product of agriculture and an output curve such as (II) diagramed in fig. 1, it necessarily follows, except for the special case where the output curve shifts to the right, that a movement in the aggregate demand curve (DD) must be accompanied by a substantial price change and by a inconsequential quantity change. The geometry of the demand-output cross is simply such, granting the above exception, that any shift in demand (it is assumed to be the more flexible edge in the scissors relation-

ship) must result in a relatively small response along the quantity axis and a relatively large response along the price axis.

III

An hypothesis has been sketched regarding the aggregate demand for, and the aggregate output of, the national agricultural plant. A severely inelastic output curve replete with a special curve shifting mechanism is postulated. Similarly, a severely inelastic demand curve is postulated and related through time to the output curve. The next step, then, is to see how well our hypothesis squares with the world. Or more concretely, is there any empirical evidence to substantiate the aggregative hypothesis?

To test this hypothesis, however, it becomes necessary to restrict somewhat our field of inquiry. An aggregative output function for agriculture may be constructed with some meaning and facility. But an aggregate demand function for the product of agriculture is not so easily constructed, and once constructed along compromised lines, it has little economic meaning. Thus, for purposes of this analysis an aggregate demand curve for food is related to an aggregate output curve of food. This procedure weakens the analysis in one way—some substitution takes place in the production process between tobacco and cotton on one hand and food items on the other, hence, the output curve for total food may be somewhat more elastic than the output curve for the total product of agriculture. But a meaningful demand function related to the output function is needed to complete the analysis; thus, there seems to be little choice but to accept an output function which represents something less than the aggregate product of agriculture.

Since the quantity data we shall be working with in the empirical analysis are realized data (the plotted observations in fig. 2 represent the amount of product that farmers are induced to produce by the prices received during the planning phase, modified by plus and minus influencing factors at work during the production period), in order to test the aggregative hypothesis it is necessary that one critically important analytical requirement be satisfied. That requirement is that, the demand curve moves along and the stimulus-response sequences thus initiated occur along *a positionally fixed schedule of intentions to produce.* It should be clear why the above analytical requirement must be satisfied if we are to obtain a true output curve. For should the schedule of intentions to produce (i.e.

output curve) move and the demand curve remain fixed, the resulting points would trace out a demand curve. And if, as it may happen, both curves are shifting, we obtain nothing more than a line connecting an historical series of price-quantity points. So if we are to test the hypothesis—that the aggregate output curve is severely

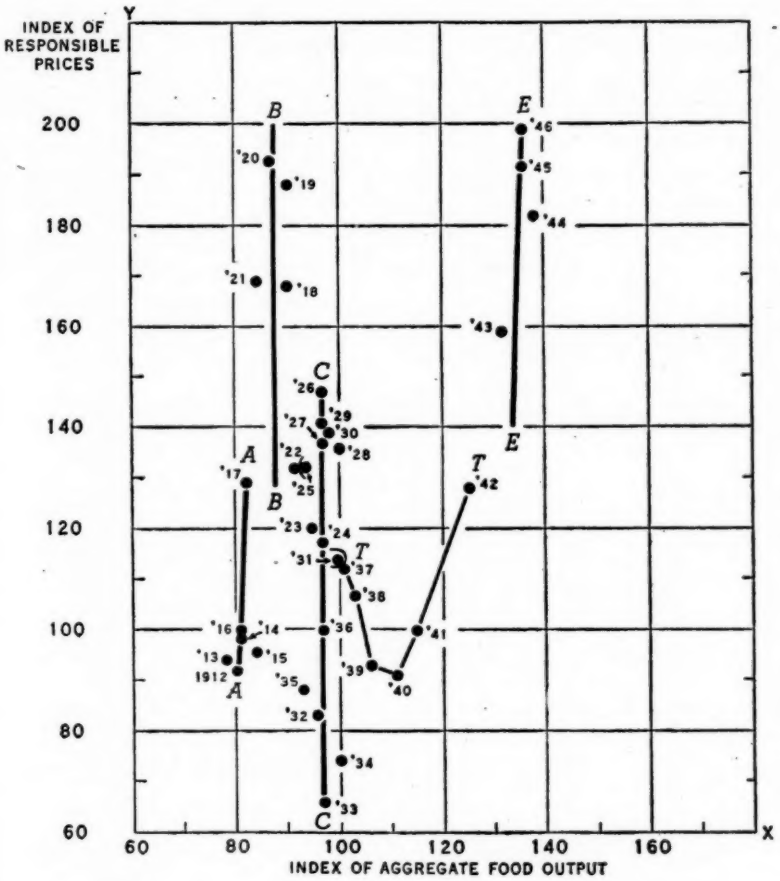

FIG. 2. The index of aggregate food output is plotted against the index of responsible prices to yield a nest of aggregative output curves. These curves are historical in the sense that they emerge through time. But the quantity points through which the curves are drawn are a function of prices (responsible prices), thus in those cases where the schedule of intentions to produce remains unchanged throughout the phase (1912–17, 1918–22, 1923–36, and 1943–46) the fitted curves must be the true output curves.

inelastic—using realized data, we must find a period or periods in which (1) aggregate demand is shifting and (2) changes in productivity—changes in output per unit of input—are at a minimum.

When we relate an index of aggregate food output[8] to an index of "responsible prices"[9] over the historical period 1912–46, the resulting price quantity points fall into a definite and meaningful pattern (see fig. 2). In appraising the configurations of fig. 2, however, it must be constantly held in mind that the years (e.g. 1944, 1945, and 1946) associated with particular points refer only to realized output. The responsible prices—the prices that induced these outputs—are of an earlier date corresponding to the beginning of the production process. The movement in demand and the stimulus-response sequences centered around the demand curve are simply assumed here, with only the "end product" realized output taking on concreteness in the form of a quantity point. And from these realized output points which differ from the original intentions only by the modifying factors at work during the production process we derive the output curve.

It will be observed that there are five historical phases (1912–17, 1918–22, 1923–36, 1937–42, and 1943–46) through which curves are drawn in fig. 2. It is our contention that four of those curves (AA, BB, CC, and EE) are true output functions. No significant change in productivity (output per worker) occurred in agriculture during any one of those phases, although it certainly changed—increased

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[8] Nonfood items are simply broken out of the index of the volume of agricultural production for sale and consumption in the farm home (source, Division of Statistical and Historical Research, Bureau of Agricultural Economics) to yield an index of aggregate food output. This index was used in preference to several others for two reasons: (1) The nonfood items were easily removed from total agricultural production, and most important, (2) it is less sensitive, than other indices that might have been used, to the weather influencing factor.

[9] The term "responsible prices" refers to those prices which *cause* farmers to make the decisions that they do in planning for this year's or the current year's production. Thus, we may expect the responsible prices, in most cases, not to be current prices, but rather the prices received in some earlier period: In the case of annual crops, perhaps when last year's crops were sold; or in the case of dairy or beef cattle, perhaps the two years previous to the year in question. The index of responsible prices used in fig. 2 upon which much of this analysis turns is constructed with the following price leads: (1) lambs, chickens, hogs—average monthly prices from July of the previous year to June of the current year; (2) beef cattle—average price for the current year and two previous years; (3) eggs—average price for the current year and previous year; (4) dairy products—average price for the current year and two previous years; (5) crops—average monthly price from July to December for the previous year.

TABLE 1. INDICES OF FARM EMPLOYMENT AND OUTPUT PER WORKER (1935–39=100)

Year	Farm employment[1]	Index of agricultural production for sale and home use[2]	Output per worker	Comments
1912	110	85	77	
1913	110	81	74	
1914	110	86	78	AA phase.—Fixed productivity —average output per worker =77 on index.
1915	110	86	78	
1916	110	83	75	
1917	108	86	80	
		(Jump in productivity)		
1918	104	90	87	
1919	102	91	89	BB phase.—Fixed productivity —average output per worker =86 on index.
1920	104	92	88	
1921	105	83	79	
1922	105	91	87	
		(Jump in productivity)		
1923	104	94	90	
1924	104	98	94	
1925	105	97	92	
1926	106	100	94	
1927	103	98	95	
1928	104	102	98	CC phase.—Fixed productivity —average output per worker =94 on index.
1929	103	99	96	
1930	102	98	96	
1931	102	102	100	
1932	101	96	95	
1933	101	96	95	
1934	99	93	94	
1935	102	91	89	
1936	101	94	93	
		(Jump in productivity)		
1937	100	106	106	
1938	99	103	104	TT phase.—Productivity increases continuously from 106 to 130 on index.
1939	98	106	108	
1940	97	110	113	
1941	95	113	119	
1942	95	124	130	
		(Jump in productivity)		
1943	94	128	136	EE phase.—Fixed productivity —average output per worker =143 on index.
1944	92	136	148	
1945	90	132	147	
1946	92	131	142	

[1] Includes farm operators, other family workers, and hired workers. Annual averages, source: *Farm Wage Rates, Farm Employment and Related Data*, BAE, 1943, p. 155.

[2] Source: *Agricultural Statistics*, USDA 1945, p. 437.

—as between the delineated phases (see table 1). Nothing changed technologically within each of the phases under consideration to cause farmers in the aggregate to plan to produce more product at the same price in the succeeding year than in the current year. Consequently, the shifting demand curve *within each phase* traces out an output curve which is representative of the aggregate schedule of intentions to produce.

Does the evidence presented in table 1 indicate that our requirement, that the schedule of intentions to produce remain technologically fixed over a period of consecutive years, is satisfied? We think it does. The indices used in computing changes in productivity (output per worker) are standard and are regularly used, and four distinct periods of *stable* productivity emerge over the entire period 1912–46. For the six year period 1912–17 the mean average on the index of output per worker is 77, the extremes are 75 and 80 and no trend is apparent in the data. For the five year period 1918–22 the mean average on the index of output per worker is 86, the extremes are 79 and 89, and no trend is apparent in the data. For the 14-year period 1923–36 the mean average on the index of output per worker is 94, the extremes are 89 and 100, and no trend is apparent in the data. And for the final period 1943–46, the mean average on the index of output per worker is 143, the extremes are 136 and 147, and again there is no apparent trend in the data. In sum, we discover for the historical period in question four discreetly separated phases varying in duration from four to 14 years in which productivity—output per worker—is fixed, stable, unchanged; and variations around each mean appear to be random. And since demand conditions fluctuated from moderately within the AA phase to violently within the CC phase, the resulting realized output points within each phase must trace out four different output curves, each representative of the theoretical schedule of intentions to produce.

It is perfectly clear that the slope of each of the empirically drawn output curves (AA, BB, CC, and EE) in fig. 2 is almost identical—parallel—with each of the other three curves. Further, each of the curves is severely inelastic, bordering on the perfectly inelastic. Thus we conclude that the output function for food in the aggregate is completely or almost completely inelastic. For any given period and productive organization, sustained output is the norm. Food output in the aggregate is totally or almost totally

unresponsive to changes in price (price level in this case).[10] This conclusion is certainly not revolutionary. Most economists have felt or known vaguely for a long time that the aggregate output function for agriculture was inelastic (although the reasoning here applies only to total food output). But now we know a little bit more about how inelastic the aggregate food output curve really is, and we may know a little more about what the curve really is.

Now it may be argued that the mechanics of our analysis forces a perfectly inelastic output curve since each time the index of output per worker increases the output curve is shifted to the right. And it is only when the index of output per worker remains constant that we draw in a curve. Thus, the output curve must be perfectly inelastic. But such an argument is fallacious. The output functions isolated in fig. 2 could and would take on a more elastic slope if higher prices induced a greater employment on farms producing food, and lower prices induced a reduction in employment. For the aggregate product will vary in size, if the persons employed in producing food vary in number, *when worker productivity is constant.* But total employment in agriculture (a relationship which must hold for the food component) tends to hold constant[11] or decline modestly over the historical period under consideration, as if completely oblivious to price movements, whereas in the nonagricultural segment total employment fluctuates markedly in response to price movements.[12] Using employment as the unit for measuring productivity, the elasticity of the slope of the output curve depends on the number of persons employed—and it is simply the unique constancy of employment in agriculture which produces a perfectly inelastic output curve.

To this point nothing has been said concerning the curve TT in fig. 2. We purposely delayed any discussion of the curve TT be-

[10] The question might be asked—Would the use of relative prices, farm prices relative to nonfarm prices, change the slope of these output functions? The answer is no. Since these curves are perfectly inelastic or practically so, all the use of relative prices would accomplish is a reduction in the amplitude of the curves. And since we have already argued that agriculture is, figuratively speaking, a water-tight compartment, the employment of relative prices in the analysis does not logically follow.

[11] The other extensive factor, number of acres harvested, has remained practically constant from 1917 to 1946 at 350 to 360 million acres.

[12] For example, over the long period of generally rising prices, 1937–46, agricultural employment remained almost constant (actually declining from 10.8 million to 10 million) whereas average number of persons employed in nonagricultural establishments increased from 30 million to 38 million. Even though we are dealing with employment in the aggregate, it seems evident that the aggregate may expand in the nonfarm segment, whereas it holds constant on the farm side.

cause it has properties separate and distinct from the other four curves. It is not an output curve. In fact, it should not be dignified by the name, curve. The TT phase and the line drawn through it is nothing more nor less than a line connecting a series of quantity points. It is true that the curves AA, BB, CC, and EE are also drawn through historical quantity points. But the basic difference between the line TT and the other curves is that productivity—output per worker— increases each year in the TT phase and not in the other phases. Thus we have the phenomenon of the output curve and the demand curve both shifting through time with the consequence that the realized output points do not fall into a functional relationship.

Since we know the slope of the aggregate food output curve to be similar to AA, BB, CC, and EE, and we also know by reason of the position of the realized output points that the output curve is drifting to the right, it follows that a curve perfectly inelastic or nearly so could logically be drawn through each of the annual observations 1937, 1938, 1939, 1940, 1941, and 1942. We must now face up to the problem—How it is that the output function remains stable or fixed in a given quantity position over a number of years, then shifts to the right to a new and more productive position, sometimes remaining in this new position for another series of years (e.g. from AA to BB), or in another context continues to shift to the right taking up successively more productive positions each year? To explain adequately pricing behavior in agriculture we must provide an explanation for this shifting action.

It will be remembered that an hypothesis was set forth in section II which said that the movement of the output function is related to the movement of the demand function, and it is the movement of demand which is causal. Given a situation wherein a pool of unused technologies and "know how" exists or the introduction of an innovation sufficiently important to force a reorganization in the productive organization occurs; add to this a strengthening in demand conditions—a shift in the demand curve to the right—we may then expect the output curve itself to shift to the right. The strengthening in demand induces operators to invest in new technologies, and the new technologies in turn increase the output per unit of input. On the other hand, a contraction in demand—a shift of the demand curve to the left—does not result in a reversing action by the output curve. In any situation, other than the special

but important case where the aggregate demand for food is increasing in conjunction with technological development, sustained output is the norm for agriculture. That, briefly, is a restatement of our hypothesis.

Observing the shifting action by the aggregate output curve in fig. 2 and reviewing the economic history of the period between 1912 and 1946, it is evident that each shift to the right by the output curve has occurred (1) as the demand for food in the aggregate was increasing, and (2) in conjunction with a significant technological development at the production level. There are periods within the historical range 1912–46, however, when demand conditions were strengthening or at least maintaining a strong position, when the output curve does not shift to the right (e.g. 1918, 1919, and 1920; 1925, 1926, 1927, 1928, and 1929; and 1943, 1944, 1945, and 1946). Demand was increasing in each of those periods but not output per worker, consequently the output curve does not shift to the right under the stimulus of increasing demand. It is also abundantly clear from fig. 2 that the output curve does not shift back to the left with a contraction in demand. Neither does it assume an elastic position (slope downward and to the left). With a decline in demand the resulting quantity points trace out a curve as nearly perfectly inelastic as it is possible to draw a curve. Falling prices simply fail to induce a smaller output. Thus, the cushioning or braking action of a contracting supply present (in theory at least) in the usual demand-supply relationship does not come into play to help stabilize the gyrating farm price level.

The basic technological development occurring on farms in the 1912–46 period was the development of the gasoline engine with all the accessories surrounding it. The strong trend toward mechanical power on farms diverted thousands of acres of land and other resources away from the production of feed for horses and mules to the production of food for human consumption. It is estimated, for example, that 50 million acres were released for food production during the last 25 years.[13]

Beginning with the year 1916 the number of tractors on farms began to increase rapidly and in such total numbers as to affect production techniques (especially on the Great Plains). Also, the number of acres harvested increased significantly between 1916 and

[13] Glen T. Barton and Martin R. Cooper, *Farm Production in War and Peace*, December, 1945, p. 6. USDA.

1918. Thus an explanation is offered for the shift in the output curve from the position AA to the position BB between 1917 and 1918. And if the period 1917–19 had not been a war period—a period in which machinery and equipment supplies for domestic use become extremely scarce—it is possible that the output curve would have continued to shift to the right. For, other things being equal, farm operators probably would have purchased and placed in operation a greater number of tractors and other machinery than they actually did. But aggregate output did not respond to the violent price increases of that period because it could not—the slope of the output curve was fixed by the limited manpower resources; the position of the curve was fixed by limited supplies of machinery and equipment. Consequently the outlet for the greatly expanded demand took the form of higher prices as the sequence—realized output, to expanded demand, to increased price, to plans for increased production, to realized output once again—formed a neat staircase up the fixed schedule of intentions to produce.[14]

When the demand for food in the aggregate drops precipitously in 1921 and 1922 the output curve does not shift back to the left to the original AA position. Rather, the resulting quantity points trace out a curve perfectly inelastic as the demand curve works down a perfectly inelastic schedule of intentions to produce. But following the business recession in 1921 and 1922 the demand for all foods began to expand once again, and contrary to the war experience we do not obtain an extreme price response. With the increase in aggregate demand the output curve shifts to the right taking up a new and more productive position CC. And the total realized food output as expanded in 1923 and 1924 actually sold at a lower level of prices than in the depressed year of 1921 (see current year prices in table 2).

The aggregate food output curve does not retrace the 1918–22 phase for one important reason—the gasoline engine. The gasoline engine became an important source of power on farms during the 1920's, as tractors on farms increased from approximately 250 thousand in 1920 to nearly one million in 1930,[15] and thereby re-

[14] The actual or the index of food prices for any year can be seen in table 2, and should not be confused with the responsible prices used in fig. 2. For any crop year prices are the result, but in turn become responsible for the output responses of some future year.

[15] (Sherman Johnson) *Production Adjustments—1945 and Postwar;* address before the Outlook Conference, Nov. 19, 1944, p. 15.

TABLE 2. PRICES RECEIVED BY FARMERS FOR FOOD 1910 TO DATE, INDEX NUMBERS (1935–39=100)

Year	Index
1910	91.3
1911	83.2
1912	90.5
1913	94.0
1914	94.9
1915	93.0
1916	107.7
1917	153.3
1918	174.6
1919	186.1
1920	181.3
1921	119.1
1922	116.2
1923	116.9
1924	116.5
1925	136.8
1926	137.8
1927	131.8
1928	137.6
1929	137.8
1930	120.3
1931	86.0
1932	64.5
1933	64.8
1934	76.5
1935	98.7
1936	104.7
1937	111.7
1938	94.0
1939	90.9
1940	94.7
1941	116.4
1942	146.4
1943	175.9
1944	174.7
1945	182.6
1946	210.7

leased considerable productive capacity from the production of feed grains and hay for work stock to the production of food products for human consumption. And these increases in output per unit of input made possible by the gasoline engine and made practical by a strong demand literally jumped the output curve to the right into a more productive position (CC).

The demand for food, however, continued strong throughout the 1920's, and tractors and power machinery were added to the na-

tional farm plant at a rapid rate over the entire 10-year period. Why is it then, that the output curve does not continue to shift to the right between 1925 and 1928 when the two conditions of a strong demand and the proper technological base would seem to be satisfied? Frankly, we are not sure. But two considerations may be involved. First, although the general purpose tractor was introduced in 1924[16] it was not widely known or used until the middle and late 1930's. And it may well be that simply adding old type tractors with wide treads was not enough. Once the older type of tractor had forced a reorganization in productive organization in the Great Plains, it was spent as an efficiency producing force, for its design severely limited its use in the Corn Belt. Second, although prices were high absolutely as compared with the "Golden Age of Agriculture" (1910 to 1914) they were not high relative to price expectations immediately following World War I when heavy indebtednesses were assumed by farmers in the purchase of high priced land. The outlook of farm people was dampened in the late 1920's so that they did not purchase and put into operation the amount of new machinery and equipment that the abstract conditions in fig. 2 would seem to warrant. In sum, the number of tractors on farms and the appendaging equipment increased substantially during the late 1920's, but it did not occur at the rate necessary, or in the form necessary, to increase output per unit of input.

But the aggregate demand for food did not continue to expand and force the level of food prices to the dizzy height obtained in 1920. The demand for food began to fall in 1930 and it fell violently in the early 1930's. *But here we observe that the output curve does not skip back to the 1918–22 phase (BB position) with a contraction in demand in a reversing action.* With the decline in demand which occurred in the early 1930's the empirically drawn aggregate output curve traces out a perfectly inelastic curve. The output curve in this phase is a classic example of sustained output. Being blessed or cursed with relatively high overhead costs and low operating costs farmers maintained production at or near the capacity levels achieved during the 1920's.

During the early 1930's technologies continued to pour forth, but at the experimental level rather than the production level. Again those developments are organized around the gasoline engine. Important innovations also occurred in the field of biology. But in the

[16] Barger and Landsberg, *op. cit.*, p. 207.

main they were not put into practice. The demand and price situation did not warrant their adoption. Hence, a great pool of technologies and "know how" accumulated during the early 1930's, the various items of which began to find their way into individual farm operations between 1937 and 1939. But when farm prices and incomes advanced with the war boom (1940–42) the latent technologies were jammed into practice.[17]

The period, 1937–42, is the perfect example of the output skipping action postulated in section II. The aggregate demand for food became increasingly stronger over the period, and thus created the favorable price and income expectations necessary to the heavy investment in machinery and equipment. And with the huge pool of technologies developed in the early and middle 1930's, actually placed in operation, farm productivity continued to rise over a 6-year period. So by 1942 we obtain a situation wherein aggregate output at any given price is substantially greater than was the case in 1937. This situation is described in more vivid terms by Barton and Cooper:

> "The war period really represented the pay-off period, or the time when farmers were able to use to greatest advantage the large supplies of modern farm machines that were developed, and improved time and again, during the last 30 years. Although the wartime demand exceeded greatly the restricted supply of labor-saving farm machines, farmers as a whole had more tractors and tractor equipment than at any time in the history of the country. Numbers of grain combines, corn pickers, field silage harvesters, pick-up balers, side-delivery rakes, milking machines, and some other popular machines, are greater now than before the war. These helped immeasurably the depleted labor force to do the tremendous wartime farm production job well and in season."[18]

The great price advances, which did not materialize between 1937 and 1942 because each time the demand curve shifted to the right, the output curve shifted with it, did come into being between 1942 and 1946. For the output curve stopped shifting to the right after 1942, whereas aggregate demand continued to expand; thus the staircase sequence develops wherein the price level is higher with each succeeding year. Now it is possible that the national farm plant was completely organized into the best adapted productive organization by 1942, so that further investments in machinery and equipment would not have further stepped up productivity. But for our

[17] See *Agricultural Statistics*, 1945, pp. 454–455, tables 590, 1 and 2, for data on the manufacture and sale of power equipment and farm machinery from 1929–44.

[18] *Op. cit.*, p. 2.

purpose it does not really matter, for we know that further extensive investments in machinery and equipment were shut off just as they were in World War I. Thus, further increases in productivity, assuming they were attainable, were limited by the war effort, and we have a satisfactory explanation as to why the output curve ceased shifting to the right.

Assuming that the above historical interpretation of the movement of the aggregate food output curve is tenable, how do the empirically developed curves square with the conceptual curve postulated in section II? A quick comparison might lead to the conclusion that the curves are unalike. But a closer inspection of the two curves or nests of curves forces the conclusion that the basic properties of the two sets of curves are the same—only the empirical curve is somewhat more inelastic than originally conceived. The empirical curve shifts to the right in much the same manner as that postulated for the output curve in fig. 1, *when the movement of aggregate demand is taken into consideration.*

Given a strong or expanding demand and a situation where new technologies are still to be incorporated into the production organization, then we can look for the aggregate output to shift to the right. But upon the achievement of, or realization of the best adapted organization, further movements of the demand curve—expansion or contraction—must trace out a severely inelastic phase of the aggregate output curve. *Given the best adapted production organization,* output is unresponsive to changes in price; sustained output at or near maximum capacity is the norm.

The time has come—not to speak of cabbages and kings—but rather the aggregate demand for food. What does the aggregate demand curve for food really look like? What is its slope, and what are the elasticities of that slope? One empirical formulation is presented in fig. 3—the formulation which is defined as the aggregate demand for food for purposes of this analysis.[19] The regression line

[19] To derive the line of regression shown in fig. 3 a multiple regression analysis of per capita food consumption, per capita disposable income, the ratio of food prices to nonfood prices, and the "catch all" factor time was first made. From the multiple correlation analysis the net variations in per capita food consumption associated with income and time were isolated and removed. Then the ratio of food to nonfood prices was related to an *adjusted food consumption series.* In other words, the multiple regression analysis provides the weight of each factor influencing consumption and once the weight of each influencing factor became known, the influence of income and time were removed so that the remaining variations in food consumption might be related to the price ratio. For a more detailed treatment of this technique see *Methods of Correlation Analysis,* Mordecai Ezekiel, p. 181–182.

(DD)[20] in fig. 3 shows the relation between (1) the ratio of food prices to nonfood prices and (2) the per capita consumption of food *after the net effects of income and trend have been removed from the consumption data.* Stated differently, the curve DD associates the relative prices of food with the per capita consumption of food after the curve shifters income and trend have been removed.

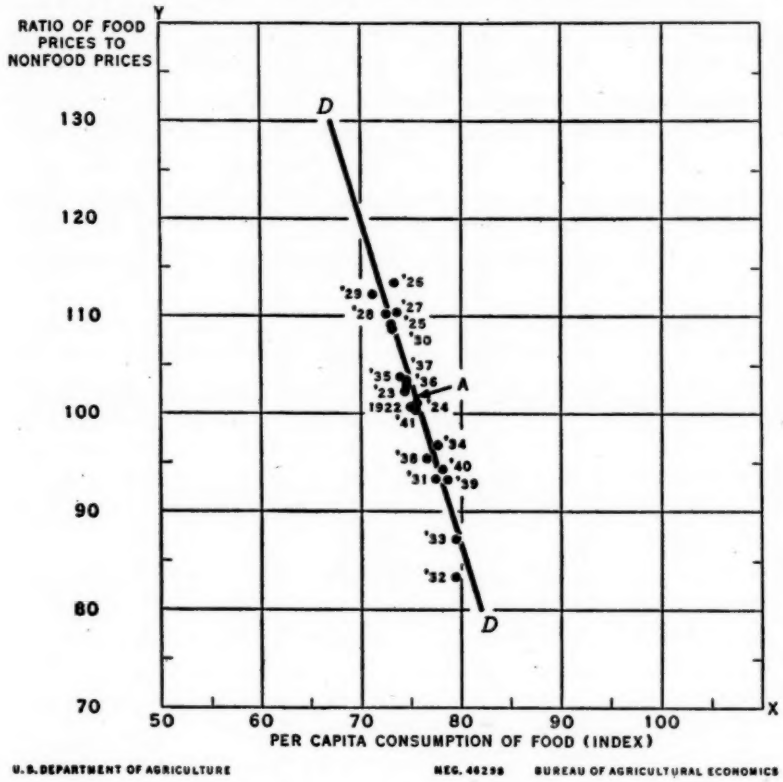

FIG. 3. The line DD may be defined as the aggregate demand curve for food. It is a regression line fitted to the points relating the ratio of food prices to nonfood prices on one hand, and per capita food consumption adjusted for income changes and trend on the other (the war years are excluded from the regression for obvious reasons).

The question may be raised—Is the regression line (DD) in fig. 3 conceptionally a true demand curve? To the writer there is little doubt. It shows the different quantities of food consumed—taken—

[20] The equation of this line of regression is given by $Y=346.95-3.25X$.

as the price of food changes relative to the price of all other consumer items. And the function is negative—slopes down and to the right—which is true of all demand functions. Further, it will be observed that a clear, if not perfect, relationship emerges when the adjusted data are plotted.

The slope of the empirically formulated aggregate demand curve is almost identical with the curve postulated in section II, which means that the elasticities for comparable points on the two curves are similar, and both are highly inelastic. For example, the elasticity of demand of the empirical curve is -.41 at the point of averages (point A). In somewhat different terms, a 10 percent rise in the price ratio is associated with a 3 percent reduction in the per capita consumption of food. In short, the historical price-quantity data support the original hypothesis regarding the demand for food—namely that the aggregate demand function is severely inelastic.

IV

When the empirically derived curve is superimposed upon the empirically derived output curve, we can trace out clearly the effects of changes in demand upon prices and output (see fig. 4). Absolute quantities are not shown in fig. 4, but the slopes of the demand-output curves are facsimiles of those presented in figs. 2 and 3. Hence, the central thesis of this paper finds substance in the following analysis.

Given the slope and position of the aggregate demand curve and aggregate output curve in fig. 4, and a situation wherein the output curve is technologically fixed—a situation wherein the best adapted productive organization has been temporarily achieved—we then have the basic ingredients out of which to provide an explanation of the dramatic price movements in agriculture. We can provide, for example, a rationale for the 1950 postulations[21] where the descent from full employment to a serious depression is accompanied by a precipitous drop on the index of prices received by farmers from 165 to 75 and a modest decline on the index of production from 135 to 115.

Specifically, should the demand curve shift to the right, from DD to D_1D_1 (fig. 4), between the planning phase and the harvesting for sale phase of crop year 1, the realized output Q_1 (ON amount)

[21] Postwar Agriculture and Employment, *What Peace Can Mean to American Farmers*, Misc. Pub. No. 562, USDA, p. 25.

will sell for a price P_1 (OB value) as indicated on the curve D_1D_1. And the price P_1 in turn induces farmers in the aggregate to plan to produce Q_2 product (OR amount) in crop year 2. It will be observed that the price increase A to B associated with the increase in de-

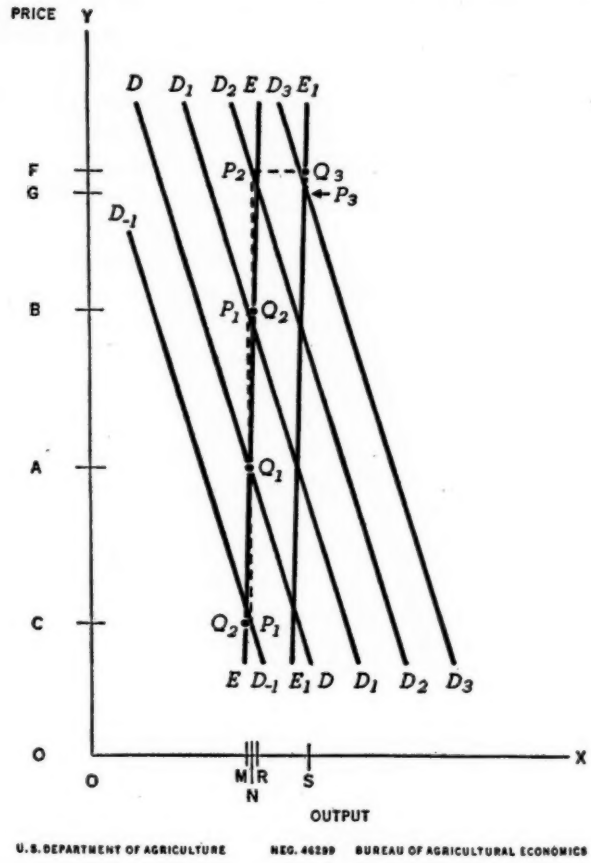

FIG. 4. The aggregate demand curve DD from figure 3 is superimposed on the aggregate output curve EE from figure 2.

mand is more than proportionate to the increase in demand (over 3 times), and the output increase N to R is less than proportionate to the increase in demand (practically negligible). In short, an increase in the demand for food results in an almost exclusive price response.

Now let us look at the economic consequences of a decrease in demand. The resulting effects of a decrease in demand are the exact converse of those isolated with an increase in demand. When the business outlook darkens and demand conditions weaken, farm operators do not so revise their intentions to produce that we obtain a new and more elastic schedule of intended output. Neither do they revise their intentions to produce so that the output curve shifts back to the left. Farmers confronted with a falling market react in a definite and defiant manner—*by maintaining their output.* Thus in fig. 4 we obtain a precipitous price decline (A to C) with practically no reduction in output as demand falls from DD to $D_{-1}D_{-1}$.

We have pursued the price-output sequence up and down a fixed output curve. If now we make two assumptions—(1) that aggregate demand is expanding, and (2) that one or more innovations occur of sufficient importance to force a reorganization in the farm plant with the result that the plant becomes more efficient—we may expect the output curve to take up a new and more productive position E_1E_1, representing a clear break with the older output curve (EE). Given a strong demand and an improved technological base, farm operators from a new schedule of intentions to produce involving a greater number of output units for each measure of price. Thus we obtain a price *and a quantity* response of consequence with an increase in demand, but not within the framework of a static demand and supply relationship.

Referring back to fig. 4 it is assumed that aggregate intentions to produce Q_2 product are exactly realized, and this total product is sold for P_2 price (OF value) as indicated on the expanded demand curve D_2D_2. But the expansion in demand has also shifted the schedule of intentions to produce to the right; thus the price P_2 induces farmers in the aggregate to try to produce Q_3 product (OS amount) in crop year 3, with the result that the increase in demand does not spend itself in a further price rise, but rather calls forth an additional product which, assuming the demand curve holds constant, moves into consumption at price P_3 (OG value) somewhat below the P_2 level of crop year 2. Here, then, is an explanation for the food price-output behavior between 1938-41. The price level holds fairly constant as demand expands, because the output function drifts to the right absorbing the force of the expansion in demand.

In the formal demand-output relationships presented in fig. 4 price declines modestly as the output curve shifts to the right in conjunction with the movement of the demand curve because we made the shift in output exactly equal to the shift in demand. Now if the shifting action of the output curve had been greater in magnitude than the shifting action of the demand curve, the point of price determination coming at the end of the production period would have been substantially lower; or, if the shifting action of the output curve had been smaller than the shifting action of the demand curve, the resulting price would have been higher than that indicated in fig. 4. Such results necessarily follow from the geometrical relationships involved.

These formal constructions pose the pre-eminently practical question: In a current situation how do we know whether an increase in demand will induce the output curve to shift to the right or simply force a steep price rise along the old output curve? And assuming for the moment that a given increase in demand induces a shift in the output curve to the right, what magnitude of shift in the output curve is associated with what magnitude of increase in demand? We have no pat formula that gives a unique answer to these questions. In each current situation the economist must sift out the relevant data and forces at work and make his own analysis or forecast. But we do believe we have provided a framework—a logical system—in which any particular analysis might be made.[22]

To sum up, the key concept of this analysis is illustrated by the aggregate output curve (EE) in fig. 4. That curve is the graphical expression of the phrase—sustained output. The national farm plant concerned with food production operates along such a curve and within such a framework as to make the curve EE the output norm. This is not to overlook the short elastic or curve skipping phases; they play an important role in the larger pattern. The skipping phases of technological innovation and reorganization make possible the seemingly impossible: sustained output on one hand and increased productivity on the other. But once given the unresponsive pattern of output peculiar to agriculture, where prices may fluctuate wildly over a considerable period and output

[22] A quantitative analysis is planned as the subject of a future paper, wherein the effects of a known shift in demand, say through the vehicle of a Food Allotment Program, are evaluated through the theoretical framework developed here with the results stated in terms of the conventional prices received index.

change almost not at all, then the movement of demand can do nothing but trace out a severely inelastic output curve. Obviously the more inelastic the slope of demand curve the more violent the price fluctuations must be; but in no way do the price swings effect adjustments in production, and hence output. Aggregate output simply does not contract or expand in response to general price changes and thereby help to stabilize the supposed causal element, namely, price.

USE OF THE ANNUITY PRINCIPLE IN TRANSFERRING THE FARM FROM FATHER TO SON

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ONE fourth of all farm ownership transfers occur within the family.[1] Scattered studies further indicate the importance of family assistance in helping farmers to achieve ownership of their farms.[2] The basic problem in many of these intra-family farm ownership transfers grows out of the fact that the lifetime savings of most farm parents are in their farm land, livestock and equipment. As a general rule, farm parents do not have sufficient cash or non-farm investments on which they can retire and turn their farms over to their children. Consequently, the parents either continue to farm for a living or lease the family farm to a son or daughter. The first situation discourages the children from taking over the farm. The second situation generally fails to provide for the transfer of ownership of the farm to the child on the farm when the parents die.

Other parents are using a plan which permits them to turn over the management, operation and eventually the ownership of the family farm to their children at an early age, while reserving an annual income for themselves for the remainder of their lives.[3] This idea is commonly known as the "bond of maintenance" land-transfer arrangement. It is also referred to as a "bond of support" and a Bohemian contract.

The gist of this plan is the annuity principle, which has long been used in the field of insurance, though based on more precise calculations. The use of the annuity principle has a twofold purpose,

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* The author is indebted to John F. Timmons, of the Bureau of Agricultural Economics, for helpful suggestions and criticisms.

[1] Agricultural Statistics, 1938, U. S. Dept. of Agriculture, p. 451; John F. Timmons, *Social and Economic Aspects of the Devolution of Agricultural Land Through Descent, Will and Gift,*" doctorate thesis, University of Wisconsin, 1945, pp. 121–135.

[2] Kenneth H. Parsons, and Eliot O. Waples, *Keeping the Farm in the Family,* Research Bull. 157, Agr. Exp. Sta., University of Wisconsin, 1946; J. T. Sanders, *Farm Ownership and Tenancy in Texas,* U.S.D.A. Bull. 1068, 1922.

[3] Parsons' and Waples' bulletin, p. 22; Timmons' thesis, p. 113; Eliot O. Waples, *Farm Ownership Processes in a Low-Tenancy Area,* doctorate thesis, Univ. of Wisconsin, 1946, p. 220; Carl F. Wehrwein, "Bonds of Maintenance as Aids in Acquiring Farm Ownership," *Journal of Land and Public Utility Economics,* Nov. 1932, p. 396; George S., Wehrwein, "The Problem of Inheritance in American Land Tenure," this JOURNAL, April, 1927, p. 163.

"The children receive their inheritance when they are still young enough for it to help them materially in making their way in the world; and the parents are safeguarded from financial worry in their declining years."[4] A wider use of this principle in intra-family farm transfers would encourage farm parents to turn their farms over to their children at an earlier age and enable the parents to live from their annuity incomes. A definite plan, with tables which expedite its adoption, will be discussed after a brief review of other—more common—alternative methods by which land-inheritance transfers are made.

Some Alternative Methods of Transferring Farms from Parents to Children

Except in a few areas, relatively little is known of the extent to which farm properties are passed along as going concerns from one generation to the next. When free lands were abundant, the matter was of little consequence. But with the passing of the frontiers, we—like the people in the older countries—are giving more attention to stewardship of the soil and the transfer of farms from parents to children as economical units. Agricultural policy has long encouraged family-sized farms and technology has since enlarged our ideas of what constitutes an economical unit.

There are, of course, situations where further division of farm lands can be justified; but, by and large, it is no longer feasible to divide up the family farm—giving this 40 to Jim and that 40 to Jane—even for sentimental reasons. And to auction off the farm with its stock and equipment every generation, in order to obtain the money with which to settle the estate, usually results in loss to the heirs and an interruption of livestock and soil conservation programs for the farm.

Scattered studies lead us to conclude that most farmers make no wills and, in passing intestate, the *laws of descent* apply. From the standpoint taken in this article, these laws are not satisfactory except where there is only one heir. Only then would the farm be transferred intact to the heir. If there are two children, for example, they may be able to agree on a value of the farm and arrive at an equitable division of the estate; but no doubt the difficulties in

[4] E. C. Harwood, and Bion H. Francis, *Insurance and Annuities from the Buyer's Point of View*, American Institute for Economic Research, Cambridge, Massachusetts, 1935, p. 151.

keeping the farm within the family as a unit increase with the number of children—because of differences in opinion that can only be settled at a public sale.

The making of a *will* is open to parents who, because of concessions to or from one or more children or for other reasons, are not satisfied with the distribution of the estate that will occur under the laws of descent applicable in their State. While this method of passing the farm to a child as an operating unit meets our requirements, it does not—except in isolated cases—have enough flexibility to meet the majority of situations. Generally, one child could not be willed the entire farm and its stock and equipment without doing an injustice to the other heirs. While the will could impose payments from the beneficiary of the will to the other children, this responsibility would require an unusual amount of judgment by the parents and might create friction later. Financial relationships within a family often change quite rapidly and the codicil attachments to the will probably could not be kept up to date.

Both the laws of descent and the will are open to the criticism that the exact time they will become effective is unknown. Furthermore, rights under intestate laws may be changed by the will, and the will itself may be changed at any time during the lifetime of its maker, thus creating additional uncertainty for the son. He may not be willing to await the result, particularly if an opportunity elsewhere appears attractive.

Under neither plan can a father transfer his farm to a son during his own lifetime, retaining for himself an income out of his accumulated savings. What, then, is the solution where one seeks security and the other opportunity? Much of the lifetime savings of the older farmer have come from increased land values resulting from the disappearance of lands to be homesteaded, and it is quite natural for him to consider his land as his wealth. Yet the accumulation of equities through accruals in land values will be much more doubtful for the son. As the future narrows, the needs of the parents diminish. They think more of the future of their children and more in terms of current income for themselves than net worth or asset valuation—even though the latter is merely the capitalization of the former.[5] After all, it is the income produced by the physical assets that will establish their level of living. Any arrangement between

[5] No doubt the income idea has been given impetus by recent high income-tax laws.

father and son should be on a business basis, as that is the only way the elderly couple can retain a feeling of independence and at the same time avoid hard feelings among the children.

Under any arrangement whereby the son remains on the farm, it appears that the farm must provide sufficient income to support both families. Then why not a partnership or joint-ownership arrangement between father and son? The advantages and disadvantages of such arrangements will require further discussion.

Under a *partnership* or *"tenancy in common"* between father and son, each may own a certain interest in the undivided property—not necessarily equal shares. If the arrangement is carried out formally, the determination of shares necessitates an actual division of property interests and of future income. If one dies, his share becomes part (or all) of his estate and must be divided in accordance with his will, or, if none was made, in accordance with the laws of descent. Thus these arrangements do not place the farm permanently in one name as a going concern. Usually they would merely prolong the transfer problem and sale of the farm, since an ultimate sale would probably be necessary in order to divide the farm value between the survivor and the heirs of the deceased partner.

Partnerships often lead to dissension between the partners. Each is the agent of the other and, as such, may bind him in transactions within the course of business. Each is jointly and severally liable for the acts of the other. If the father retires under the partnership, he could be held liable for future debts unless he gave notice of a limited partnership arrangement—perhaps by insertion in the local newspaper—together with details such as the capital contribution of each partner in the new arrangement.

What about a *joint tenancy with right of survivorship?* Usually such arrangements contain some such clause as " . . . to *A* and *B* as joint tenants, to hold as joint tenants, and not tenants in common, and to the survivor of them." Under this clause the share of the first joint tenant passes to the surviving joint tenant and not to the heirs of the deceased. If the father dies first, the son would become sole owner; but if the son died first, the farm would be back in the hands of the father, and our problem would not be solved.

It is much more likely, however, that the father would pass first, so that the son would obtain the farm as a unit. While the arrangement would provide for the old folks during their lifetime, unless

they have other holdings which they can divide by will among the other children, this plan is also not flexible enough to permit an equitable distribution of the estate among the children.[6]

As stated previously, if family transfers could be put on a more businesslike basis, it is quite likely that more farmers at the older ages would turn their farms over to their children and live off an investment income rather than a labor income.[7] The mechanics whereby transfers may be made from living parents to one of the children (we will assume a son in the remainder of the article) for a fixed future income have long been used in the field of finance and insurance. Their application to this particular problem is presented in the next section. If there is a son ready and willing to take over the family farm when the parents are ready to quit, the application of the annuity idea would permit them—in effect—to "sell" the farm to him on condition that he pay them a future income during their lives. The parents could take a mortgage on the farm to guarantee payment of the monthly income by the son. Upon death of both parents, this mortgage would be cancelled. Thus a farmer might, by application of the annuity principle, provide for his own declining years and at the same time—if he has sufficient capital—liberate part of his holdings for use by his children while he still lives. It is with the practical application of this idea that the remainder of this article deals.[8]

The Farm Transfer Plan Based on the Annuity Principle

The *first* step would be to have the farm value appraised. The appraisal probably should be at a "normal agricultural value" rather than at market value. It is true that when farm prices are high the other children may feel that they are being disinherited if the farm is sold to a son at less than it could be sold to others. On

[6] In some States property may not be vested in a joint tenancy with right of survivorship until it has first been conveyed to an individual who will not be one of the joint owners and then, by that person, be reconveyed to the joint tenancy. Of course this third party should be honest and have no outstanding court judgments against him.

[7] Still more farmers would consider retiring if old age and survivor's insurance were extended to farmers.

[8] A word of warning should be inserted, however, against any attempt to simplify the transfer of real property to avoid administration costs, for example by preparation of a deed to be filed for record after the owner's death. Such procedure could cloud the title in such a way that it would be difficult and expensive to clear. The conveyance should be bona fide and recorded where necessary. This will also avoid the question of whether or not an inheritance tax was due because of non-effective transfer.

the other hand, if the parents wished to retire in a period of low prices, the purchasing son might feel that he was paying more for the farm than it was worth. But if all heirs understand the intent and fairness of such an appraisal, there should be no hard feelings among them. Certainly from the standpoint of the purchasing son, his long-term commitment should be in relation to the average earning power of the farm. Otherwise, the purchasing son might find it very difficult, perhaps impossible, to meet his commitments when farm prices were low.

As a *second* step, the parents must decide how much of the farm value will be required to provide the necessary periodic future income. The accompanying tables will be useful in this determination.

The transaction, involving the release of the farm to a son, is a sale just as surely as if the farm were sold to an outsider and the money used to buy an immediate annuity from an insurance company. If the farm were actually sold to an outsider and the money used to buy an annuity, approximately 6½ percent of the purchase price would be "loading" for company expenses, and 93½ percent would be a "pure" or net cost calculated as necessary to make the contracted future payments to survivors. Thus $935 under the proposed plan would buy the same income as $1,000 would buy if placed with an insurance company.

Tables have been prepared and are included which show the monthly income, payable for life, that may be purchased with $1,000 at different ages for single and joint lives. Methods used by insurance companies in computing the purchase price of life annuities are used, with the exception that loading for company expenses has been omitted. Calculations are based on the 1937 Standard Annuitants Mortality Table, using a 2½ percent interest rate. Being net, of course they include no expense loading.

If only one parent is living, table 1 can be used to find the monthly income that might be purchased at different ages with a $1,000 lump-sum payment. It has been found that women annuitants live about 5 years longer, on the average, than men of the same age, so the income that can be purchased for a given sum is the same for a man aged 60, for example, as it is for a woman aged 65. This is recognized practice in all annuity calculations based on life contingencies and has been used in all tables (except table 3).[9]

[9] As stated, tables 1 and 2 are based on the *actual* ages of males and, in the cases of females, ages that are in each case *5 years less* than the actual age. This "aging

TABLE 1. MONTHLY PAYMENTS FOR LIFE THAT $1,000 WILL BUY AS A SINGLE LIFE ANNUITY[1]

Age of male	Age of female	Monthly payment
Years	*Years*	*Dollars*
50	55	4.72
51	56	4.88
52	57	4.95
53	58	5.07
54	59	5.20
55	60	5.34
56	61	5.48
57	62	5.64
58	63	5.80
59	64	5.97
60	65	6.15
61	66	6.34
62	67	6.54
63	68	6.75
64	69	6.97
65	70	7.21
66	71	7.46
67	72	7.73
68	73	8.02
69	74	8.32
70	75	8.64

[1] Based on 1937 Standard Annuitants Mortality Table, 2½ percent interest. Under this type of annuity the monthly payments are made during the life of the annuitant.

General formula:

x = age

R = monthly payment

$$R=\frac{83.333333D_x}{N_{x+1}+.54578D_x}.$$

"N" defined as "bar N" or $D_x+D_{x+1}\ldots$ to end of table.

Calculation for male aged 64 (or female aged 69):

$$R=\frac{83.333333\times 144{,}909.4}{1{,}653{,}095.7+79{,}088.652}=\$6.97.$$

back" of females for calculation purposes is to take care of their greater longevity. Of course actual ages only are shown in the tables and the ages used for calculation purposes are immaterial insofar as the use of the tables is concerned. Some companies, in calculating the "pure premium" cost of their life annuities, use ages that are one year less in each case than those described above. They "age back" the male life one year and the female life six years (one additional year) to compensate for the increased longevity which they believe has more recently taken place in both male and female lives. Such companies would, for example, arrive at the same monthly income for age 66 (in the case of either a male or a female life) that is shown opposite age 65 in tables 1 and 2, provided the sex is the same. Identical figures from the commutation columns would be used for both calculations.

TABLE 2. MONTHLY PAYMENTS FOR LIFE THAT $1,000 WILL BUY AS A JOINT LIFE AND ⅔ SURVIVORSHIP ANNUITY[1]

Age of male	Male older than female					Equal ages	Female older than male		
	5 yrs.	4 yrs.	3 yrs.	2 yrs.	1 yr.		1 yr.	2 yrs.	3 yrs.
Years	Dollars								
50	3.97	4.01	4.05	4.10	4.14	4.18	4.23	4.27	4.32
51	4.05	4.09	4.13	4.18	4.22	4.27	4.31	4.36	4.41
52	4.13	4.17	4.22	4.26	4.31	4.36	4.40	4.45	4.50
53	4.21	4.26	4.30	4.35	4.40	4.45	4.50	4.55	4.61
54	4.30	4.35	4.39	4.44	4.50	4.55	4.60	4.65	4.71
55	4.39	4.44	4.49	4.54	4.60	4.65	4.71	4.77	4.83
56	4.48	4.54	4.59	4.65	4.71	4.76	4.82	4.89	4.95
57	4.58	4.64	4.70	4.76	4.82	4.88	4.94	5.01	5.07
58	4.69	4.75	4.81	4.87	4.94	5.00	5.07	5.14	5.20
59	4.80	4.86	4.92	4.99	5.06	5.13	5.20	5.27	5.34
60	4.91	4.98	5.05	5.12	5.19	5.26	5.34	5.41	5.49
61	5.03	5.11	5.18	5.25	5.33	5.41	5.49	5.57	5.65
62	5.16	5.24	5.32	5.39	5.47	5.56	5.64	5.72	5.81
63	5.30	5.38	5.46	5.54	5.63	5.72	5.80	5.89	5.98
64	5.44	5.52	5.61	5.70	5.79	5.88	5.98	6.07	6.17
65	5.59	5.68	5.77	5.87	5.96	6.06	6.16	6.26	6.64
66	5.75	5.85	5.94	6.04	6.15	6.25	6.35	6.46	6.57
67	5.92	6.02	6.13	6.23	6.34	6.45	6.56	6.67	6.79
68	6.10	6.21	6.32	6.43	6.54	6.66	6.78	6.90	7.02
69	6.29	6.40	6.52	6.64	6.76	6.88	7.01	7.13	7.26
70	6.49	6.61	6.73	6.86	6.98	7.12	7.25	7.39	7.52

[1] Based on 1937 Standard Annuitants Mortality Table, with a 2½ percent interest rate. Under this type of joint-life annuity the monthly payments shown are paid while both male and female are alive. After one dies the other is paid only two-thirds of the amounts shown.

General formula:

x = age of male

y = age of female

R = monthly payment while both are alive

$\frac{2R}{3}$ = monthly payment to survivor

"N" defined as "bar N" or $D_x + D_{x+1} + \ldots$ to end of table

$$R = \frac{83.333333}{\frac{2}{3}\left[\frac{N_{x+1}}{D_x} + \frac{N_{y-4}}{D_{y-5}}\right] - \frac{1}{3}\left(a_{x:y-5}\right) + .54578}.$$

The age of a single life corresponding to two joint lives may be obtained from actuarial tables. For example if male is aged 69 and female aged 64, there is a difference of 10 years in the ages at which the calculations are made. For a 10-year difference, 5.050 years may be added to the older age and the joint-life calculation (represented by the symbol "$a_{x:y-5}$") thus adjusted may be treated as a single life.

Calculation for male aged 69 and female aged 64:

The female age is considered as 59 in the calculations.

$$R=\frac{83.333333}{\frac{2}{3}\left[\frac{N_{70}}{D_{69}}+\frac{N_{60}}{D_{59}}\right]-\frac{1}{3}\left[\frac{.95N_{75}}{D_{74}}+\frac{.05N_{76}}{D_{75}}\right]+.54578}$$

$$=\frac{83.333333}{\frac{2}{3}\left[\frac{1,036,265.5}{109,328.5}+\frac{2,452,393.8}{182,696.6}\right]-\frac{1}{3}\left[\frac{.95(589,010.48)}{76,665.16}+\frac{.05(518,416.26)}{70,594.22}\right]+.54578}$$

$$=\frac{83.333333}{\frac{2}{3}(9.47846+13.42331)-\frac{1}{3}(7.29875+.36718)+.54578}$$

$$=\frac{83.333333}{13.25832}=\$6.29$$

If both parents are living, table 2 may be used to find the "joint life and $\frac{2}{3}$ survivorship" annuity that might be purchased with $1,000 at stated ages. Under these annuities the monthly payment that is made while both parents are living is reduced to $\frac{2}{3}$ of the former payment when one parent dies. The two-thirds payment of course continues until the death of the last survivor. Since it costs more for both parents to live than one, this type of annuity more nearly fits the needs of the parents than a straight joint life and survivorship annuity, under which the same amount is paid to the surviving parent as to both parents. Under the latter plan, the monthly payment while both parents are living would be less than under the $\frac{2}{3}$ survivorship plan which is proposed and upon which table 2 is based.

After deducting the present value of the future annuity income from the appraised value of the farm, the remainder would be the residual estate. As the *third*, and last, step, the residual estate is divided among the children. If the division is to be equal, the purchasing son would deduct his own share and arrange to pay the other children their shares. His payments to them might be amortized over a selected period at an agreed interest rate. Notes or junior liens might be used to secure payment of these debts.

Example

An illustration will bring together the various steps and also illustrate the use of the tables.

Suppose that the appraised normal agricultural value of the

TABLE 3. PERIODICAL PAYMENT OF ANNUITY WHOSE PRESENT VALUE IS $1

Period of amortization	Rates of interest				
	2½ percent	3 percent	3½ percent	4 percent	4½ percent
Years					
1	1.02500000	1.03000000	1.03500000	1.04000000	1.04500000
2	.51882716	.52261084	.52640049	.53019608	.53399756
3	.35013717	.35353036	.35693418	.36034854	.36377336
4	.26581788	.26902705	.27225114	.27549005	.27874365
5	.21524686	.21835457	.22148137	.22462711	.22779164
6	.18154997	.18459750	.18766821	.19076190	.19387839
7	.15749543	.16050635	.16354449	.16660961	.16970147
8	.13946735	.14245639	.14547665	.14852783	.15160965
9	.12545689	.12843886	.13144601	.13449299	.13757447
10	.11425876	.11723051	.12024137	.12329094	.12637882
11	.10510596	.10807745	.11109197	.11414904	.11724818
12	.09748713	.10046209	.10348395	.10655217	.10966619
13	.09104827	.09402954	.09706157	.10014373	.10327535
14	.08553653	.08852634	.09157073	.09466897	.09782032
15	.08076646	.08376658	.08682507	.08994110	.09311381
16	.07659899	.07961085	.08268483	.08582000	.08901537
17	.07292777	.07595253	.07904313	.08219852	.08541758
18	.06967008	.07270870	.07581684	.07899333	.08223690
19	.06676062	.06981388	.07294033	.07613862	.07940734
20	.06414713	.06721571	.07036108	.07358175	.07687614

Formula:

R = Fixed annual payment, which includes interest and reduction of principal.
i = Annual interest rate, expressed as a decimal fraction.
n = Period of amortization in years.

$$R=\frac{i}{1-(1+i)^{-n}}=\frac{i(1+i)^n}{(1+i)^n-1}\cdots \text{per \$1 of debt.}$$

Determination of annual payment required to amortize a $1,676 debt over 10 years if interest is at 4 percent:

$$R=1{,}676\times.12329094=\$206.64$$

farm, with all its buildings and equipment, is $15,000. Let the age of the father be 64 and age of the mother be 61. Suppose, further, that there are 3 children, 1 a son.

Now let us suppose that the parents agree that they can live on $72 a month or its equivalent, part in produce from the farm, and that ⅔ of this amount, or $48 a month, will be sufficient for one after the other is gone. Of these amounts, let us assume that $63 a month will be needed for living, expenses and $9 a month for rent, while both parents are living, and that after one is gone the other will need only $42 for living expenses and $6 for rent.

If we divide the $72 by $5.61 (found in table 2 opposite age 64 and in the column applying to male aged 3 years older than the female) and multiply the result by $1,000, we find that such payments would require a $12,834 principal.

If only the mother (aged 61) were living, we would use table 1 (based on single lives) to arrive at the present value of an annuity of $48 a month. For a female aged 61, $1,000 would buy a life annuity of $5.48 a month. Dividing $48 by $5.48 and multiplying by $1,000, we find that the present value of such payments is $8,759.

Returning now to our joint-life calculations, we deduct the $12,834 from the $15,000 appraised farm value and have left an equity of $2,166 to be divided among *all* the children, including the son who purchases the farm.

If the residue (estate) is to be divided equally among the three children, each child is entitled to $722. The son who purchases the farm could pay $722 to each of the other two children in periodic instalments. Table 3 shows the periodical payment of an annuity certain of which the present value is $1, using various terms and several interest rates.

In the illustration, if the children agree on a 10-year amortization period and a 4 percent interest rate, we multiply $722 by .12329094 (found opposite 10 in the 4 percent column of table 3), and find that the son who purchases the farm would have to pay *each* of the other two children $89.02 at the end of each year for 10 years before his debt to them—incurred when he takes over their equities in the estate—is extinguished.

The main point here is that the farm has been sold to one son and that there is a residual estate which is to be divided equally among *all* the children. The purchasing son must, therefore, pay off the other two children before he can claim full ownership to the farm. These payments to the other children, as calculated, must be considered as payments certain—to be made to their estates even though they die in the meantime—and not payments subject to a life contingency. Open notes or junior liens could be given to secure payments of these debts.

Under the arrangement, the purchasing son would pay the parents $72 per month, and they—in turn—could pay him $9 a month for the use of the rooms or separate dwelling to be occupied by them. Or the son might pay them only the difference, or $63 per month. This rental arrangement between father and son would not

preclude the parents from moving elsewhere if they wished. If they did, the son would merely increase his payments from $63 to $72 a month.

The rent in the illustration has been placed on a "⅔ survivorship" basis so that another use can be made of table 2.[10] Suppose that the parents desire to settle once and for all the matter of rent, since they always intend to remain on the farm. It is possible to use table 2 to commute the value of any services or facilities that are to be retained by the parents during their lifetime, for example rooms in the main dwelling or use of a separate building.

We previously found that—at the specified ages of the parents—$1,000 would buy a monthly income of $5.61 during their joint lives and $3.74 for the survivor from then on during his (or her) remaining lifetime. Dividing the $9 monthly rent by $5.61 (or $6 by $3.74) and multiplying the result by $1,000, we find that the present value of the future rental credits to the son is $1,604—taking into consideration life contingencies. This amount might be thought of as an offsetting entry against the value of the farm. In accounting terminology it would be considered as a credit entry in a "T" account in which the farm's appraised value was entered as a debit.

If only one parent is living, table 1 (which is based on a single life) would be used to arrive at the present value of the future rental credits. Let us assume that only the father is living. We find that, on the average, future payments of $6.97 per month, to be made during the lifetime of a male aged 64, would be worth $1,000 now, if interest is calculated at 2½ percent. Dividing $6 (the rent for one parent) by this $6.97, and multiplying the result by $1,000, we find that $861 would be the present value of the rent on rooms to be occupied by this parent.

Returning again to our joint-life calculations, if the $1,604—as the present value of future rental credits of $9 a month from both parents and $6 a month from the survivor—is deducted from the $12,834, which was determined to be the present value of the annuity computed on the basis of $72 a month, there would be $11,230 left to purchase a lesser monthly income. Referring to table 2, we find that this sum would buy $63 a month for the joint lives (and $42 a month for the survivor), which is the same figure that was obtained above after the $9 rent is deducted from the

[10] The assumption might be that fewer rooms are required for one than for both parents.

monthly income of $72, which included the rent, computed on the basis of a purchase price of $12,834.

Once settled in this manner, there would be no further consideration of the rent item. The son would merely pay the $63 (later, $42) a month to the parents. The parents could take part payment of the guaranteed monthly income in farm produce. A scale of prices to be used in computing commodity equivalents—for example, eggs at so much per dozen—would help prevent misunderstanding and would assure the old folks a more or less fixed level of living.

After determining the value of the farm and deducting the present value of a designated future income and the imputed value of the facilities to be retained by the parents during their lifetime, if there is nothing left as a residual estate, there is no inheritance to be divided.[11] The net worth of the parents was too small or their periodic income was set too high. In effect there may have been merely a sale by father to son—perhaps at too high a price. Under such circumstances there might even be some additional savings to be divided ultimately among the children. If the inheritance is decided upon first and is placed at too high a figure in relation to net worth, there may not be enough left (as the present value of a joint-life annuity) to provide a liveable future income for the parents, in which case the farm may have been sold to the son at too low a price. The parents may then become a burden to the son who purchases the farm, and in assuming this burden he would be making up somewhat for the previous miscalculation.

It must have occurred to the reader that after the appraised value of the farm and the present value of the facilities to be retained by the parents have been determined, there is an inverse relationship between (1) the equity to be divided and (2) the purchase price of the farm or present value of the joint-life annuity. Increasing one decreases the other. Furthermore, the total debt owed by the purchasing son on the date of transfer of the farm, i.e., that to the parents in the form of future income commitments plus that to the other children as their shares of the residual estate, might be expressed in symbols as follows, assuming that the residual estate is to be divided equally among all the children.

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[11] If the present value of future rental credits is not handled as a separate item, it may be considered as zero in the following discussion.

$$T = A + \frac{(n-1)}{n}(V - W - A)$$

where

T = Total debt owed by purchasing son
n = Total number of children
A = Present value of joint-life annuity
n = Total number of children
V = Appraised value of farm
W = Present value of facilities to be withheld by parents
and $V - W - A$ = Residual estate.

In the illustration, the purchasing son would owe, at date of transfer of the farm, $14,278. His payments to the parents would amount to $72 per month or $864 a year, and his payments to the other two children would amount to $178 a year. His total annual payments in the immediate future will therefore be $1,042. A variable payment arrangement between father and son may prove advisable in some instances. If the son's obligations are heavy, he would want some leeway in meeting fixed expenses when farm income is low. At such times the living expenses of the parents will probably be less, so that a variable-payment scheme would fit into the annuity plan very well.

Advantages

In transferring the farm from father to son as a going concern, the capacity of the farm to produce is uninterrupted. The farm continues to produce for the parents as before, except that the constant income received is derived from interest earned—2½ percent as computed—and a gradual depletion of the capital investment itself. The interest portion is large at first and grows smaller; while the capital depletion is small at first and grows larger. Added together they always remain the same.

The judgment of the father, gained through years of experience on the farm, is valuable to the son whose interests have been bolstered by ownership. The security value of the farm as a going concern is normally greater than its salvage value at an auction sale in order to "clean up" the estate. The difference is kept within the family and the security behind the mortgage which the parents

take on the farm (to secure payment of the annuity by the son) is maintained.

There are also direct financial gains to the family when the parents set up life estates which assure continuity of the family on the farm. When a farm is sold at auction in order for the estate to be divided among the children, a commission of 5 to 10 percent must be paid. Furthermore, there may be some savings in probate administration costs by settling the estate while the parents are alive.

The proposed plan would put the care of the parents on a more businesslike basis, and, if fairness has been followed, make the burden of this care more equitable among the children. The feeling of independence which a definite monthly income arrangement gives the parents should not be overlooked. They must be cared for anyway, and while there is in effect an early division of the family capital, due to the application of the annuity principle, the parents are not required to measure their future independence against a yardstick of diminishing capital.

Disadvantages

In dealing with many lives, an insurance company can—with precision—calculate the single premium required to guarantee lifetime payments of a selected amount to an annuitant. It has the advantage of the "law of large numbers." It can use the sums left by those who die early to pay those who live to ripe old age. In assuming the function of an insurance carrier, the son would be accepting the responsibility of lifetime payments to parents, one or both of whom might live far beyond their life expectancies. If they live long, the monthly payments would have to be continued equally long. If they die early, the other children might consider that they had been disinherited. This feeling would not, however, be justified. The responsibility of the purchasing son, in guaranteeing a lifetime income to the parents, should be fully understood at the start by all heirs.

It may have occurred to the reader that if the parents' annuity were of the instalment-refund type, in the case of their early death the other children would have something coming to them from the purchasing son. While this is true, refund annuities are seldom used in connection with older lives because of the effect of the mortality factor in reducing the amount of the monthly instalments. If there-

is to be a refund of the remaining purchase price if death occurs before a specified guarantee period (usually 10 years) has expired, the chances of such a refund are much greater at the older than the younger ages. For a male aged 64, for example, the life expectancy is only 15 years, according to the 1937 Standard Annuitants Mortality Table. If monthly payments were guaranteed for 10 years, they must necessarily be much smaller at that age than if the annuity were without refund in case of early death. Usually the farm value would not be sufficient to provide a liveable income at the older ages under the refund type of annuity. For that reason, tables showing the monthly income that can be purchased with a $1,000 payment at different ages under a refund guarantee have not been included.

Although the annuity plan does not require the parents to live with or close by the son and his family, doubtless such an arrangement would fit into most retirement plans either (1) because the annuity income will not be enough to permit the parents to pay a going rental price or (2) because they want to remain on the farm. In either case, there is always the possibility of friction later on. In placing all dealings on a businesslike basis at the start, some of these misunderstandings may be avoided.

MALADJUSTMENTS IN THE WOOL INDUSTRY AND NEED FOR NEW POLICY

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BETWEEN the two world wars, *world* production and consumption of wool were kept in fairly close balance by relatively free movements in wool prices, but during World War II, the close alignment between supply and demand was disrupted, and as a consequence a five billion pound, grease basis, world stock pile of apparel wool, three times the normal prewar carry-over, existed at the beginning of the 1946–47 export season. The orderly liquidation of such a huge carry-over of wool has presented a problem in the principal wool-producing and wool-consuming countries of the world.

To discuss the specific international problems arising from the large world wool surplus, and investigate possible methods of international cooperation to market wool, representatives of the principal wool-producing and consuming countries met in London on November 11–16, 1946. At this conference it was agreed that price stability of wool was essential to any program designed to expand world consumption of wool. The conference recommended the formation of an inter-governmental group to study production and marketing problems of the wool industry.

Shortly after the new Congress convened, several bills were introduced providing for a continuation of price-supports for domestic raw wool. Hearings on the Administration's tariff program before the inter-departmental Committee on Reciprocity Information were opened in Washington on January 13, 1947. The round of trade agreement negotiations involving tariff concessions on over one thousand different items, including raw materials and manufactured products, presents opportunities for realignment of foreign and domestic trade policies towards reciprocity and freer trade among eighteen nations participating in the tariff conference. These hearings were merely preparatory to negotiations which began in Geneva in April 1947, for "group bargaining" on international tariff concessions, to complete the draft of a charter establishing common principles of world trade policy, and to set up an International Trade Organization.[1] Proposals to consider possible tariff

[1] See *Charter for the International Trade Organization of the United Nations* (pre-

concessions on raw wool and wool manufactures are included in the program.[2]

Congress should reconsider the advisability for continued governmental participation in the marketing of wool and other essential commodities. The question of whether our present domestic trade policy would be compatible with our announced aims regarding foreign trade policy should be clarified. The maladjustments in the wool industry are an integral part of the whole commodity marketing problem.

The raw apparel wool market has been characterized by surplus stocks, heavy demand and rising prices—a paradoxical situation which may result in serious consequences for the wool textile industry and ultimately for the wool grower.

It is the principal intent of this paper to present some of the factors involved in appraising the domestic raw wool marketing situation (and incidentally in the foreign wool industry as it affects the domestic situation) as background which must be considered in formulating a farsighted commodity marketing policy designed to achieve a normal balance between raw wool production and consumption, and attaining price stability in the wool industry.

I. *U. S. Mill Consumption, Carry-over, and Imports*

Mill consumption of apparel wool[3] in the United States during 1941–46 averaged over one billion pounds per year, grease basis,

liminary draft (of articles devised by the Preparatory Committee of the International Conference on Trade and Employment, London, October 15 to November 26, 1946). Department of State, December 1946. Also, *Report of the Drafting Committee of the Preparatory Committee of the United Nations Conference on Trade and Employment*, United Nations: Economic and Social Council, Lake Success, New York (January 20 to February 25, 1947).

[2] See U. S. Tariff Commission, *Wool and Manufactures*, Trade Agreement Digests, Vol. XI, November 1946, Washington, D.C.

[3] Raw wool may be segregated into two broad categories—apparel wool and carpet wool. This paper is primarily concerned with apparel wool from which most worsted and woolen clothing is made. Marketing of apparel wool begins with sale by growers to local dealers, buyers for large central markets, merchants or cooperative organizations. Raw wool at all stages is generally sold on a grease basis, as it comes off the sheep. Such wool contains animal grease, dirt, briars and other foreign matter which comprises on the average about 55 percent of the gross weight. Removal of these foreign materials results in considerable shrinkage and gives a produce known as "scoured" wool. Prices for wool still "in the grease" are quoted on a scoured basis and involve an estimate of the quantity of shrinkage which will develop in the scouring process. Sales are made for cash when the wool is sold at shearing time, or on consignment to a central market agency, or by contract made prior to the shearing season. Most wool eventually arrives at one of the four large central markets—Boston, Chicago, St. Louis, or Philadelphia—where it passes into the hands of the large wool merchants who grade, store, and finally sell it. Boston is the most important of these markets.

compared with an average of 592 million pounds over the period 1935–39. Mill consumption of apparel wool for the year 1946 reached a near record high of 1,070 million pounds, grease basis, 80 percent higher than the prewar rate of consumption (Table I, Chart I).[4] Foreign wools comprised 78 percent of United States mill con-

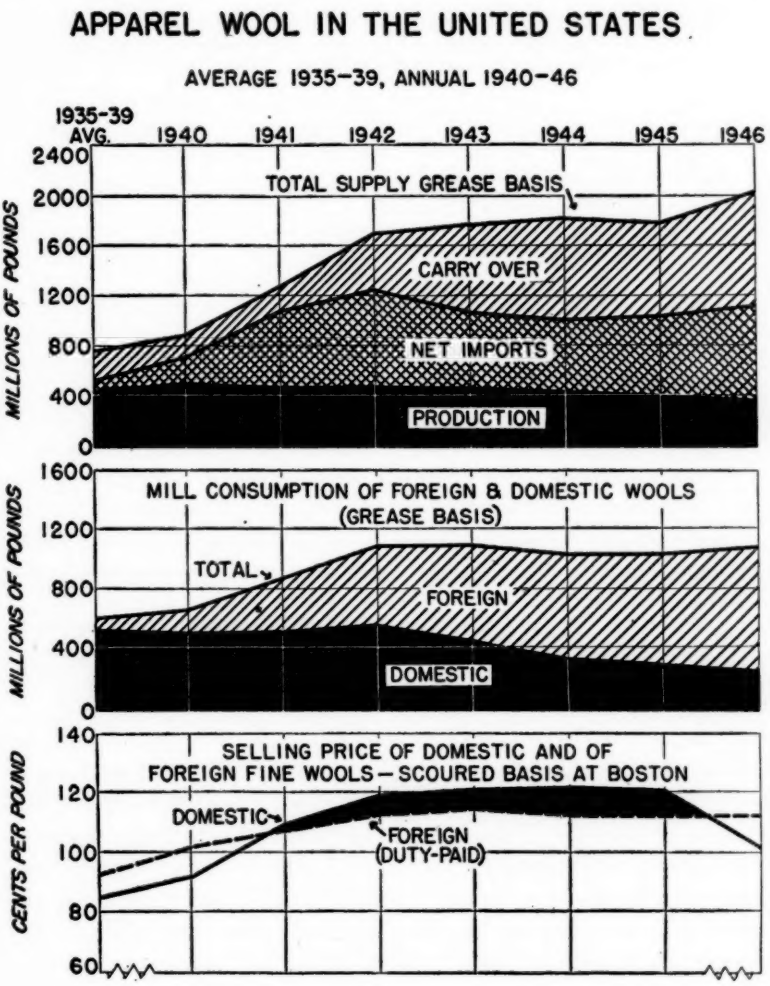

CHART I

[4] Consumption of apparel wool by mills in the United States attained a new record high of 620 million pounds, *scoured basis* in 1946—more than double the 1935–39 average of 281 million pounds (Table V).

sumption in 1946,[5] compared with 14 percent of mill consumption during the prewar period. Mill consumption of domestic wool was smaller in 1946 than in any year since 1918 when records were first kept.

Total stocks of domestic and foreign apparel wool held by mills

TABLE I. APPAREL WOOL IN THE UNITED STATES: PRODUCTION,[1] NET IMPORTS, CARRY-OVER, MILL CONSUMPTION OF DOMESTIC AND FOREIGN WOOLS, AND SELLING PRICES OF DOMESTIC AND FOREIGN FINE WOOLS AT BOSTON, AVERAGE 1935–39, ANNUAL 1940–46

Years	Supply			Mill Consumption			Selling Price		
	Production[1]	Net imports[2]	Carry-over[3]	Domestic	Foreign	Total	Domestic[7]	Foreign[8] (Excluding duty)	Foreign[8] (Duty paid)
	Million pounds, grease basis			Million pounds, grease basis			Cents per pound, scoured		
Avg. 1935–39	424	86	256.4	509[6]	83[6]	592[6]	84	59	93
1940	434	228	177.3	487	154	641	92	68	102
1941	453	614	193.8	494	483	977	109	73	107
1942	455	781[4]	447.4	541	537[6]	1077	119	79	113
1943	444	612[4]	702.3	430	631[6]	1061	120	80	114
1944	412	575[4]	815.5	319	690[6]	1009	121	77	111
1945	378	652[4]	749.2	252	761[6]	1013	120	77	111
1946	341	807	797.9	240[9]	830[9]	1070[9]	103	79	113

[1] Greasy weight of wool as shorn and pulled from domestic fleeces in the United States.
[2] Imports in actual weight but are chiefly grease wool. Net imports are imports for consumption minus domestic exports.
[3] Reported stocks, January 1. Stocks reported by mills and dealers and by United States Government. Does not include wool on farms and ranches; farm stocks normally would be small on January 1.
[4] Excludes wool entered as an act of international courtesy for storage and re-export for the British Government.
[5] Original data for 1935–39 were revised upward on basis of revised scoured basis wool. Data published by Bureau of Census.
[6] Beginning with 1942, all duty-paid foreign wools, whether apparel or carpet class, are classified as apparel wool, and all duty-free foreign wools are classified as carpet wools in Bureau of Census mill consumption reports.
[7] Territory, staple, fine and fine medium.
[8] Australian 64s, 70s, good topmaking.
[9] Preliminary.
Sources: U. S. Department of Agriculture, Bureau of Agricultural Economics. National Association of Wool Manufacturers.

and dealers and by the Commodity Credit Corporation in the United States on Januray 1, 1947, were 895 million pounds, grease basis, or more than three times the size of the 1935–39 average carry-over. Mills and dealers held 415 million pounds of apparel wool at the beginning of 1947, of which 255 million pounds were foreign wool. These stocks were about 65 million pounds larger than a year earlier, and about 62 percent higher than the average prewar inventories of mills and dealers. CCC stocks (embracing clips for the years 1943–46) totaled 480 million pounds, grease basis, on January 1, 1947. These stocks were considerably smaller

[5] Foreign wools totaled 85 percent of U. S. mill consumption in the first half of 1946.

than in mid-1946 because of increased sales to mills during the last half of the year.

Stocks of domestic and foreign apparel wool held by mills, dealers, and by the CCC on January 1, 1946, amounted to 798 million pounds, grease basis, and were equivalent to about 75 percent of consumption for the year; whereas in 1935–39 the available carry-over was equivalent to about 43 percent of the annual consumption in these years (Table II).

TABLE II. CARRY-OVER[1] OF APPAREL WOOL AND PERCENTAGE SUCH STOCKS ARE OF ANNUAL MILL CONSUMPTION, GREASE BASIS, UNITED STATES, AVERAGE 1935–39, ANNUAL 1940–47

Years	Owned by dealers and mills		Owned by U. S. Government		Total reported	Mill consumption	Stocks as percentage of consumption[3]
	Domestic wool	Foreign wool[2]	Domestic wool (C.C.C.)	Foreign wool (D.S.C.)			
	Million pounds		Million pounds		Million pounds		Per cent
Avg. 1935–39	220.5	35.9			256.4	592.0	43.3
1940	125.5	51.8			177.3	640.9	27.7
1941	122.0	71.8			193.8	977.1	19.8
1942	170.2	120.2		157.0	447.4	1077.2	41.5
1943	208.8	184.7		308.8	702.3	1061.4	66.2
1944	102.5	205.6	182.0	325.4	815.5	1009.0	80.8
1945	94.5	229.1	311.8	113.8	749.2	1012.8	74.0
1946	69.4	279.4	449.1		797.9	1070.0[4]	74.6
(July 1 Est.)							
1946	113.0	319.0	499.0[5]		931.0[5]		
1947[4]	160.0	255.0	480.0		895.0		

[1] Reported stocks January 1. Stocks reported by mills and dealers and by U. S. Government. Does not include wool on farms and ranches; farm stocks normally would be small on January 1.
[2] Includes wool in bonded warehouses which has not yet been reported in imports for consumption.
[3] Carry-over January 1 as percentage of calendar year consumption.
[4] Preliminary.
[5] Incomplete, includes only part of 1946 production, much of which had not been offered to CCC for purchase.
Sources: U. S. Department of Agriculture, Bureau of Agricultural Economics. Based on data from the Bureau of the Census and the Defense Supplies Corporation.

While Government holdings of foreign wools were liquidated in 1945–46, holdings by private handlers increased because of the shift in foreign stocks from Government to private hands during 1945–46 (Table II, Chart II).

The annual rate of imports of apparel wool since the end of 1944 has been at levels exceeding any previous 12-month period except that of 1942, when our stock pile of foreign wool was built up (Table I). Heavy mill consumption, the reluctance of mills to use higher priced domestic wools, and the prior liquidation of the foreign wool stock pile, largely accounted for these imports. Reflecting the large purchases at "issue" prices[6] by U. S. buyers in the 1945–

[6] The "issue" price was that price at which any grade or type of wool was freely offered for sale by the British Wool Control (or Joint Organization).

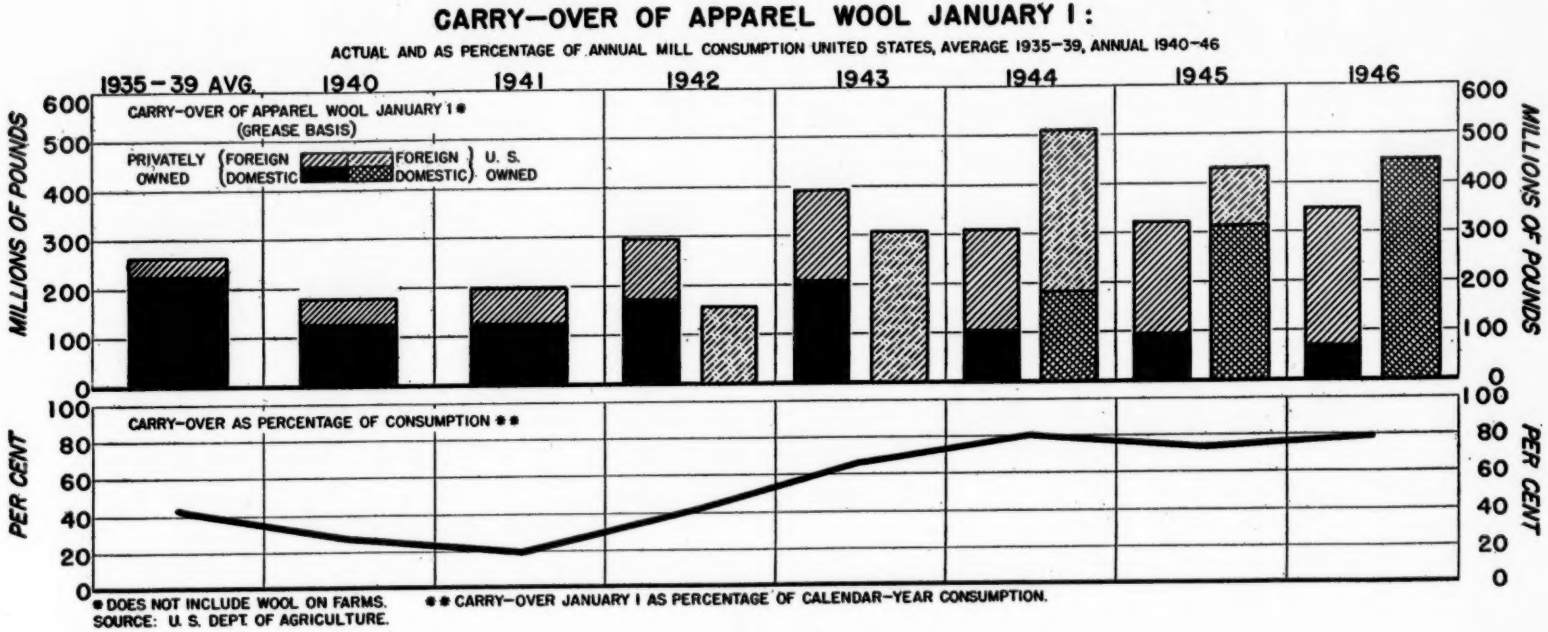
CARRY–OVER OF APPAREL WOOL JANUARY 1:
ACTUAL AND AS PERCENTAGE OF ANNUAL MILL CONSUMPTION UNITED STATES, AVERAGE 1935–39, ANNUAL 1940–46
1935–39 AVG.
1940
1941
1942
1943
1944
1945
1946
CARRY–OVER OF APPAREL WOOL JANUARY 1 *
(GREASE BASIS)
PRIVATELY OWNED
FOREIGN
DOMESTIC
U. S. OWNED
MILLIONS OF POUNDS
600
500
400
300
200
100
0
CARRY–OVER AS PERCENTAGE OF CONSUMPTION **
PER CENT
100
80
60
40
20
0
* DOES NOT INCLUDE WOOL ON FARMS.
SOURCE: U. S. DEPT. OF AGRICULTURE.
** CARRY–OVER JANUARY 1 AS PERCENTAGE OF CALENDAR–YEAR CONSUMPTION.

CHART II

46 season from the British Wool Control (replaced by the Joint Organization) in expectation of price increases at the opening of the new season on July 1, 1946, and the resumption of auctions in September, net imports of dutiable wool in 1946 reached a record high, estimated at 807 million pounds, grease basis, compared with 652 million pounds in 1945 and an annual rate of 86 million pounds during 1935–39. Imports declined in the final quarter of 1946 from the exceptionally high rate of the initial nine months of the year. Net imports of apparel wool have been higher than domestic production each year since 1941 (when they were 35 percent above production), and were 137 percent above production in 1946. Net imports in the years 1935–39 totaled only 20 percent of the domestic wool production (Table I, Chart I).

II. *U. S. Sheep Population, Production, and Tariff Policy*

The number of stock sheep on farms declined 34 percent within the previous five years and is the lowest on record dating from 1867, despite an increase of $2.63 per head of stock sheep since January 1946, bringing the average value per head to $12.20 on January 1, 1947, the highest ever recorded. Total sheep population is the lowest since 1925. Reduction in numbers of sheep has occurred in all geographic regions, ranging from a decrease of 43 percent from the 1942 level in the North Central States to 21 percent in the South Central States which include Texas.[7]

The decrease in sheep population since 1942 is largely attributable to more attractive prices (including subsidy payments) in enterprises competitive to sheep (especially beef cattle),[8] increases in costs of sheep raising (particularly for labor which accounts for a high proportion of the cash costs), and the uncertainty of future prices for wool, as surplus stocks existed in the United States and abroad so that some price decline was probably expected if support-prices were discontinued. A subsidiary factor, however, contribu-

[7] All classes of sheep declined during 1946. Ewes one year old and over, estimated at 25,340,000 declined over 8 percent and on January 1, 1947, were about 32 percent or 12,000,000 head below the total at the beginning of 1942. Ewe lambs held for replacement declined 450,000 head and were about 17 percent of the number of ewes one year old and over. This percentage is the lowest in over twenty years, except for 1945, and not adequate to check the decline in breeding ewe numbers. U. S. Dept. of Agriculture, Crop Reporting Board, *Livestock on Farms January 1*, February 18, 1947. (Washington, D. C.)

[8] Beef cattle prices and the average prices of all farm products increased more during the war (i.e. from December 1941 to August 1945) than prices of lambs or wool.

ting to the decline in sheep numbers was the high average price for sheep and lamb. Cash receipts from the sale of sheep and lambs in 1946 were the highest on record, primarily because of high lamb prices.

During the period 1943–46, the CCC wool purchase program stabilized prices to producers at an average level of 42 cents a pound, 75 percent above the prewar level, the highest prices since May 1920. However, cash receipts for shorn wool in 1946 were only

TABLE III. STOCK SHEEP ON FARMS JANUARY 1, WEIGHT PER FLEECE, WOOL PRODUCTION, ACTUAL PRICES, PARITY PRICE, PARITY RATIO FOR WOOL AND FOR ALL FARM PRODUCTS, CASH FARM INCOME FROM SALES OF WOOL, AND PRICES RECEIVED BY FARMERS FOR WOOL AND FOR ALL FARM PRODUCTS, UNITED STATES, AVERAGE 1935–39, ANNUAL 1939–47

Years	Stock sheep on farms Jan. 1	Weight per fleece	Wool production[1]	Price received by farmers	Parity price for wool	Farm price of wool as percentage parity[2]	Parity ratio for all farm products[2]	Cash farm income for wool	Prices received by farmers (1935–39 = 100)	
									Wool	All farm products
	Millions	Pounds	Million pounds	Cents per pound	Cents per pound	Per cent	Per cent	Million dollars	Per cent	Per cent
Avg. 1935–39	46	8.0	424	23.9	23.4	102.2	84	85.6	100	100
1939	46	8.0	426	22.3	22.7	98.2	77	80.7	96	88
1940	46	8.0	434	28.4	22.9	124.0	80	105.5	119	93
1941	47	8.1	453	35.5	24.2	146.7	94	137.8	147	115
1942	49	7.9	455	40.1	27.4	146.4	106	155.7	166	148
1943	48	7.9	444	41.7	29.6	140.9	119	157.8	172	179
1944	44	7.8	412	42.4	31.1	136.3	115	148.5	174	182
1945	40	7.9	478	41.9	31.8	131.8	116	129.1	171	188
1946	36	8.0	341	42.3	35.4	119.5	120	118.4	175[3]	216[3]
1947[3]	33									
January				40.6	39.3	103.0	121			
February				40.3	40.4	99.8	119			

[1] Greasy weight of wool as shorn and pulled from domestic fleeces in the United States.
[2] Average base period prices, August 1909–July 1914 = 100.
[3] Preliminary.
Note: The revised estimates of sheep numbers and wool production for the years 1940–46, shown above, are generally lower than previous estimates for these years. See *The Wool Situation*, March 1947.
Source: U. S. Department of Agriculture, Bureau of Agricultural Economics.

$118 million, the smallest since 1940, due to a decline in production estimated at 341 million pounds, grease basis, 24 percent below the 1943 record and the smallest clip since 1925 (Table III).[9] Annual domestic production of shorn and pulled wool in 1935–39 averaged 425 million pounds, grease basis, approximately 70 percent of the average yearly total consumption in the United States (Table I). The remainder of our domestic requirements during those years was

[9] Sheep and lambs on feed on January 1, 1947, were 6,029,000 head compared with 6,807,000 a year previous. The total value of all sheep amounted to $487 million, $76 million above January 1, 1946, but below the value on January 1, 1943. *Livestock on Farms January 1, op. cit.*

made up of imports from Australia, Uruguay, New Zealand, the United Kingdom, and South Africa.

The changing volume of wool production in the United States has been influenced not only by the price of wool but also by the prices of sheep and lambs sold for meat. United States tariff policy regarding apparel wool and wool manufactures and the Government action relating to wool have been important in influencing other changes in domestic wool production.[10] Except for two periods of effectiveness under the Tariff Acts of 1894 and 1913, the domestic production of raw wool has had considerable tariff protection since 1867.[11] The Tariff Act of 1913 exempted wool from duty, but the Emergency Tariff Act of 1921 restored wool to dutiable status and the Tariff Act of 1922 placed a duty of 31 cents a pound, scoured basis, on fine imported wool, which was subsequently raised to 34 cents a pound under the Smoot-Hawley Tariff Act of 1930. These rates, substantially above those in effect before 1913, encouraged the increase of domestic production to relatively high levels during the Thirties. Throughout most of the interwar period the tariff had the effect of increasing the prices of domestic wools above free world prices by the full amount of the duties, even before making allowances for the preparation differential. The influence of other policies of the Government after 1939 superseded the effects of the tariff on the price spread between domestic and foreign apparel wools.

III. *U. S. Prices*

Prices of domestic wool (territory, staple, fine and fine medium, scoured basis) at Boston in October 1946 averaged 50 percent above the level of August 1939, the month before war broke out in Europe. Average prices for this type of wool in October 1946 were about 12 percent below the wartime high of $1.20–$1.21 a pound, which prevailed throughout 1944, 1945, and in March 1947. Between August and October 1939 prices for domestic wool (territory,

[10] Moreover, the domestic prices of wool and of sheep and lambs have been influenced by the tariff treatment of them as well as by the tariff treatment and United States supplies of meats competing with lamb and mutton. Refer to *U. S. Tariff Commission Report on Raw Wool* (December 1943). Also, *U. S. Tariff Commission Report on Estimated Costs of Production of Wool, Sheep, and Lambs in 1944 Compared with Costs in 1940–43.* (January 1945).

[11] Duties on raw wool have been part of every tariff act since 1816 with few exceptions such as the Acts of 1894 and 1913. The tariff on raw wool is one of the oldest and most effective of duties on agricultural commodities. See Haldor R. Mohat, *The Tariff on Wool*, Tariff Research Committee, Madison, Wisconsin (1935).

staple, fine and fine medium, scoured basis) at Boston advanced 47 percent to $1.04 a pound, while the price of Australian wool of comparable grade and quality advanced 35 percent to $1.12 a pound, duty-paid, during this period. These increases reflected the relatively low domestic stocks (totaling 245 million pounds in August 1939), increased demand for wool caused by the war, and the inauguration of purchases in September 1939 of the entire Australian and New Zealand wool clip by Great Britain for the duration of the war, making imports of this wool and its selling price in the United States subject to decisions of the British Government.

The Army in 1940 began to place large orders for military fabrics and in 1941 took about 50 percent of the average prewar consumption. Manufacturers of worsted goods for the Army were prohibited from using foreign wools.[12] Additional upward pressure was put on domestic wool prices by the rising consumer demand stimulated by increasing purchasing power. When supplies of domestic wools became insufficient to meet requirements the Army permitted manufacturers to use foreign wools in and after November 1940. Imports increased, particularly from South America.[13] Encouraged by the Government procurement policy, the prices of domestic wools advanced considerably in 1940 and 1942 as compared with duty-paid prices of imported wools.

The domestic supply of apparel wool rose to one billion pounds, grease basis, in 1941 with domestic production at a level of 453 million pounds, grease basis. Ceiling prices for wool were established by the OPA in December 1941, and subsequently revised upward. In effect, the ceiling prices confirmed the price differentials resulting from the Government procurement policy. The CCC procured domestic wool at prices averaging about 31 percent above parity during 1943–46. The average price of domestic wool (territory, staple, fine and fine medium, scoured basis) at Boston in December 1941 was $1.13 a pound, rose to $1.20 in March 1942 and remained at

[12] Under the provisions of the Act of 1933 (sometimes called the "Buy American" Act) the use of domestic wools was required if available in grades needed and not unreasonably higher than foreign wools.

[13] Although substantial shipments from Australia were not as large as the rise in imports from South America, in October 1940, the National Defense Advisory Commission made arrangements with the British Government to store 250 million pounds of Australian wool in the United States as an emergency stock pile. The wool was stored in bond ownership, retained by the British Government, and could be sold on the United States market only when short supplies were found to exist here. About 30 million pounds of British-owned stock pile wool were in this country on January 1, 1947.

this level until April 1944, when the average price increased to $1.21. This price prevailed until the CCC adjusted its price schedule in November 1945.

IV. *Commodity Credit Corporation Program and Government Policy*

The CCC domestic wool purchase program was initiated in April 1943 in order to support prices to growers. Sale of domestic wool to the CCC was virtually mandatory with few exceptions between April 1943 and August 1945, but after restrictions were removed most of the domestic wool continued to go to the CCC because its price was above the market price. Sales in each season since 1943–44 were considerably below purchases.

The price spread between foreign and domestic wools widened over the period 1941–45. The spread between the Boston price for domestic wool (territory, staple, fine and fine medium) and imported fine top-making Australian wools of comparable grade and quality averaged 43 cents a pound, scoured basis, excluding duty, in 1945, compared with the 1935–39 average price spread of 26 cents a pound (Table I). United States mills have been partial to Australian and other foreign wools because they were graded and classified, of higher quality, ordinarily involved less market risks, and were lower priced.[14]

From July to August 1945, United States mill consumption of domestic wool fell from a weekly average of 2.1 to 1.2 million pounds. During this period, United States average weekly mill consumption of foreign wool rose from 7.7 to 8.3 million pounds. By October 1945, the use of domestic wools had dropped to .7 million pounds, whereas the use of foreign wools increased to 9.6 million pounds. Two days after the CCC solicited bids from manufacturers

[14] Foreign wools have commanded a premium usually ranging from 9 to 12 cents a pound, attributable largely to differences in preparation and marketing of domestic and imported wools. Foreign fleeces have usually been "skirted" to remove the less desirable parts and carefully graded into lots normally showing only slight variations in quality. Domestic fleeces are not "skirted" nor so closely graded, and sometimes are not graded. In addition, domestic wools are generally sold soon after shearing and buyers must finance and assume the market risks involved in holding them for periods up to six months or more. Imported wools are ordinarily bought as needed, and the foreign growers or sellers assume the costs and risks of holding them until they are sold. Unlike Australia, South Africa, New Zealand, Uruguay and other countries which have produced sheep mainly for their wool, *a considerable proportion of sheep producers in the United States (many having small flocks) probably consider wool as a by-product of mutton.* To improve the quality of wool and encourage sorting and culling of flocks, the Government of South Africa instituted a policy of having trained Government wool sorters to grade wool. If the wool failed to meet set standards, the grower was subject to a fine.

(late in October 1945) for 10 percent of the Government's wool stocks, the British Wool Control Board reduced prices from five to 14 percent, thus further stimulating the use of foreign wool.

To encourage the consumption of domestic wool by United States mills and reduce the large Government carry-over of 312 million pounds, grease basis, of domestic wool in 1945, the CCC on November 27, 1945, began selling Government stocks of domestic wool at prices below the price which the CCC had paid the growers. Prior to this date, the CCC selling price was the same as the price to growers. On February 21, 1946, the CCC announced an additional reduction in selling prices not to exceed three cents a pound for 1944–46 wools and five cents a pound for scoured 1943 wools.[15] This new price reduction, coupled with the previous reduction on November 27, 1945, lowered the selling prices for domestic wools about 8½ cents a pound, grease basis, below the prices originally scheduled by the CCC.[16]

Because it was claimed that the price to growers could not be maintained owing to competition from wool exporting countries, Senator O'Mahoney of the Senate Agriculture Committee introduced a bill, S. 2033, in April 1946 to provide for permanent wool legislation which would give wool the same benefits accorded to other agricultural commodities under the Steagall Amendment; and that the Government would support the prices of wool at not less than 90 percent of "revised parity" (the so-called "comparable" basis) for two years after the first of January following the official termination of the war. In addition, the bill further provided that thereafter the Government would support the price of wool at not less than 50 nor more than 75 percent of the revised parity price,[17] and that reductions for any one year shall not exceed 8 per cent of

[15] Some recognition was given to the "spot" position of fine domestic wools, however, as these wools were in short supply throughout 1946. Desirable domestic wools readily available in United State warehouses were priced several cents a pound above comparable duty-paid imported wools in order to take advantage of the "spot" position.

[16] *Bulletin of the National Association of Wool Manufacturers*, 1945, pp. 111–13.

[17] The revised parity formula would result in considerably higher parity prices for wool than would the use of the 1909–14 base. The parity price for wool as of Feb. 15, 1947 was 40.4 cents a pound in the grease, as determined by the original concept of parity. But, if calculated according to the revised or "comparable" price formula, the parity price for wool in February would be 50.4 cents a pound. The "comparable" price for wool would be that price which bears the same relation to the average parity prices of the so-called "basic" agricultural commodities (cotton, wheat, corn, tobacco, rice, peanuts) as the actual price for wool bore to the actual average prices of the basic agricultural commodities during the period August 1934 to July 1939.

the average support price for the previous year. The bill specifically provided, however, that *no reduction shall be made in the general level of support-prices from the 1946 level until the decline in sheep numbers is halted, except to correct inequities.* The bill also provided to make the Marketing Agreement Act of 1937 applicable to wool, and to provide for a research and development program for wool. Under this legislation, recommended by President Truman, the prices of domestic wools to United States mills would, regardless of the prices to the growers, be permitted to drop to levels competitive with the duty-paid prices of foreign wools. Financing the cost of such a support-price program (the subsidy representing the difference between the support-price to growers and the competitive price to the mills) would be handled by earmarking the customs revenue.

This bill was strongly opposed by the organized wool trade associations on the ground that it would perpetuate a system of marketing which had failed to market the domestic clip, would continue Government control of the domestic wool industry, and would discourage private initiative in the marketing of domestic wools. The bill was referred for study to the Special Senate Wool Committee, and, after extensive hearings, it was passed by the Senate as an Administration measure, but was caught in the rush to adjourn and was not voted on in the House.[18]

Although competition of foreign wools had earlier forced the CCC to cut its sales prices and large domestic stock piles of wool had accumulated, the CCC nevertheless advanced its average selling price 1½ cents a pound, grease basis, on October 14, 1946, *to bring wool prices in line with advances in the parity price of wool.*

The CCC has been prohibited from selling wool at less than parity price under legislation due to expire April 15, 1947. With domestic wool (territory, staple, fine and fine medium, scoured basis) selling at the CCC price of $1.07 a pound in mid-October 1946 (a price based on the revised farm parity price), growers received in effect a direct subsidy of 14 cents a pound when the CCC purchased this type wool at $1.21 (113 percent of parity) plus an indirect subsidy provided by the tariff of 34 cents a pound on foreign wool, making a total subsidy of 48 cents to the domestic grower. The difference be-

[18] Refer to the hearings of the Special Committee on the Investigation of the Production, Transportation, and Marketing of Wool, 79th Congress, 2nd session. Also see bill, H.R. 6043 (Report No. 2666), 79th Congress.

tween the CCC *purchase* price of this type of domestic wool and the world price for comparable foreign wool was 37 cents because foreign wool commanded a premium, 11 cents in mid-October, over comparable grades of domestic wool. While the CCC *purchase* price from growers for territory, staple, fine and fine medium wool in mid-October was $1.21 a pound, or slightly above the *duty-paid* price of imported wool of comparable quality and preparation, the CCC *resale* price of $1.07 a pound was considerably below the price of comparable foreign wool, duty-paid.

Since then, however, monthly increases in the parity price of wool have required further corresponding increases in Government selling prices. The CCC raised its average selling price of Government-owned fine wools three cents a pound, scoured basis, on November 30, 1946, and another increase averaging about three cents a pound, effective December 30, 1946. Furthermore, in accordance with the advance in the parity index of prices paid by farmers, the average price of wool was raised about 2½ cents a pound on March 1, 1947, or about 15 percent higher on the average than before the first upward adjustment was made in October. The price rise practically eliminated the differential between the CCC *purchase* price of $1.21 and the *selling* price of $1.20 for domestic wool (territory, staple, fine and fine medium, scoured basis) in March 1947. After the December price increase occurred, CCC prices for most domestic wools were again too high to compete with foreign wools.

V. *Scope and Operations of the British Joint Organization*

At the end of the war, the United Kingdom was left with an accumulation of some 3,245 million pounds (equivalent to about two years' consumption) of wool acquired under the Imperial Wool Purchase Scheme. It was recognized that the holding of this surplus might seriously affect the wool market, that the stock should be reduced as rapidly as possible while being firmly held, and that its disposal should be carefully integrated with the marketing of current clips.

A conference of officials and experts from the United Kingdom, Australia, New Zealand, and South Africa met in London in April-May 1945, and worked out an elaborate agreement for a Joint Organization to achieve unified liquidation of the surplus at appropriate prices, in such a manner as to encourage consumption without

disrupting the market.[19] The necessity for restoring a closer relationship between buyers and consumers of wool than had been possible during the war years was recognized. A return to auctions as soon as conditions would permit them to be attended by buyers from consuming countries was recommended. Before the war it had been the practice to dispose of the available supplies in the season and for prices to fluctuate to the extent required to equate supply and demand in that period.

The JO (actually a private company registered as United Kingdom and Dominions Wool Disposals, Ltd.),[20] an operating agency, stands ready to buy in any wool for which no other buyer has bid up to a "reserve" price assessed by an inter-governmental committee of the JO as appropriate to its type and quality. The JO assumed responsibility for all sales of Dominion-produced wool on November 1, 1945, and fixed "reserve" prices for 1945–46 at the same general level as the previous "issue" prices. Prior to the opening of the new season on July 1, 1946, the four governments agreed to a recommendation of the Directors of the JO that for the season 1946–47 the initial general level of "reserve" prices for Dominions' wool sold in the Dominions should be the same as the then existing average selling price *ex* store in the Dominion concerned. This was in accordance with the instructions in the disposal plan that the JO "will prescribe minimum 'reserve' prices at which it will be willing to take up any unsold new clips and it will offer at auction wool from its own stocks in such quantities as will prevent prices from rising much above the desired level."

Auctions were resumed in September and October of 1946, but, meanwhile, sales from stocks had been unexpectedly large—between July 31, 1945, and July 31, 1946, stocks had been reduced by 1,277 million pounds due mostly to (a) a quicker recovery in consumption than had been thought possible, and (b) an unexpectedly rapid stocking up (sales had been 50 percent greater than consumption).

In order to meet the large demands for wool the JO made offer-

[19] The Committee Report and Recommendation of the British Wool Disposal Scheme is reprinted in *The Wool Record and Textile World*, Vol. 68, No. 1894 (August 30, 1945).

[20] The World War I predecessor of the JO was the British-Australian Wool Realization Association, Ltd. (BAWRA), which successfully liquidated some two million bales of Dominion-produced wool in about three years following the end of the war.

ings within the limits imposed by shortages of certain types and a shortage of handling facilities. While there has been some increase in the price of certain types of wool, between 1938 and 1946 the increase in prices on Dominion wool was similar to the increase in the price of South American wool. The increase in wool prices incidentally was not as great as the mean of the increase of prices of other commodities. JO selling policies for 1947–48 have not yet been established.

In regard to the JO surplus-disposal agreements, Professor Joseph S. Davis has observed:

> "This is an important and promising experiment that will deserve close watching, especially because of three distinctive features which improve the prospects of workability. (1) Despite the drift of official opinion in favor of ICAs (International Commodity Agreements) open to adhesion by all interested governments, this wool ICA is purely a British Commonwealth agreement. (2) It provides for the appointment of a consultative committee, representing non-member wool-importing countries and the International Wool Textile Organization. This may prove adequate if, as may be anticipated, operations under the agreement will also be subject to broader international supervision. (3) Operations are entrusted, not to a governmental or intergovernmental agency, but to a corporation relatively free from bureaucratic limitations and political influence; and the Chairman of its Board is Sir Harry Shackleton, who has been United Kingdom Wool Controller since 1939."[21]

The International Wool Study Group (composed of representatives of the governments of Argentina, Australia, Belgium, Canada, China, France, Italy, New Zealand, South Africa, Uruguay, United States, and United Kingdom), referred to at the outset of this paper can be expected to examine carefully the future policies of the JO at its meeting in London in April 1947.

VI. *World Production and Carry-over*

World wool production in 1946, totaling 3,710 million pounds, grease basis, was about 12 percent below the 1941 record clip but slightly above the prewar average production (Table IV). Wool production in the British Dominions, accounting for 41 percent of world production in 1946, was slightly above the prewar average. Production in Australia, which produces over one-fourth of the world's wool, was 970 million pounds in 1946, 4 percent above the

[21] Joseph S. Davis, *International Commodity Agreements: Hope, Illusion, or Menace?*, The Committee on International Economic Policy (New York, 1947) p. 45.

1945 output. The British Dominions, which ordinarily produce about three-fourths of the *apparel* wool used throughout the world, are the chief competitors of United States wool producers.

World stocks of apparel wool at the beginning of the 1946–47 season (about July 1) were estimated to total about five billion pounds, grease basis, which is more than three times as large as 1934–38 average stocks and is much larger than in any previous

TABLE IV. WORLD WOOL PRODUCTION AND CARRY-OVER, AVERAGE 1934–38, ANNUAL 1939–46

Years	Production[1]	Carry-over[2]
	Millions of pounds (grease basis)	
Avg. 1934–38	3,720	1,579
1939	4,120	N.A.
1940	4,210	N.A.
1941	4,240	N.A.
1942	4,150	N.A.
1943	4,130	N.A.
1944	3,920	N.A.
1945	3,740	5,097
1946[3]	3,710	4,958

[1] Mostly wool shorn plus pulled wool and wool on skin at shorn equivalent.
[2] Apparel wool.
[3] Preliminary.
Source: U. S. Department of Agriculture, Bureau of Agricultural Economics.

peacetime year. Shifts in foreign stocks from Government to private owners in 1945–46 were appreciable. Approximately 40 per cent of the estimated world carry-over of apparel wool was owned by the JO in 1946 compared with about 66 percent of the world total in 1945. Carry-overs in five Southern Hemisphere exporting countries —Australia, New Zealand, South Africa, Argentina, and Uruguay —at the beginning of the 1946–47 season were indicated to total about 2.7 billion pounds, grease basis, compared with the revised estimate of three billion pounds in 1945. The 1946 stocks included a considerable quantity of wool in the British Dominions which had been sold and was awaiting shipment to Northern Hemisphere importing countries. If *world* consumption of wool continued at the high levels attained during the last quarter of 1946 (which is considerably above world production) then the world wool carry-over would be reduced for the first time since 1939 or 1940. *Only a relatively small part of the carry-over consists of good quality, fine-grade wools.*

In order to liquidate the stock pile it will be necessary for manufacturers to use more of the defective types of wool, which ordinarily require substantially more labor to work up into the finished articles than do the free types. Hence, when labor is a limiting factor in mill output, mills may process a smaller proportion of defective wool.

VII. *U. S. Mill Consumption and Consumer Income*

Comparison of mill consumption of wool with consumer income during the prewar period indicates that mill consumption of apparel wool in 1946 was considerably above the rate shown by the estimated prewar consumption-income relationship (Chart III

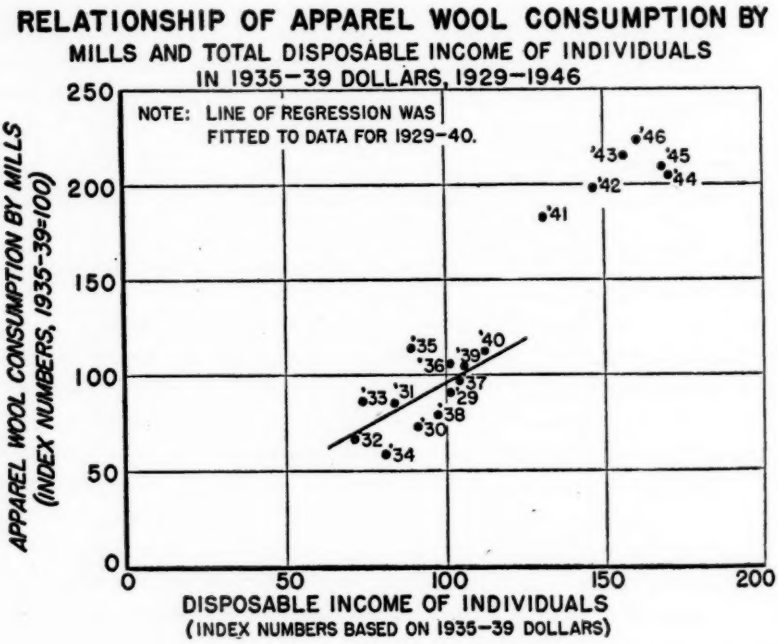

CHART III

Table V). The large shift in demand for apparel wool during the war years and in 1946, compared with the prewar period, poses the question of *how much of this expanded consumption of wool will be*

retained within the next few years when demand returns to "normal."[22]

The primary reason for the "abnormal" quantity of wool consumed during the war years in relationship to consumer income was the large quantity of woolen goods purchased by the Army and Navy. However, consumer incomes doubled during the war and, as durables disappeared from the market, consumers spent more for nondurables such as clothing.[23] Mill consumption of wool in 1946 and

TABLE V. ANNUAL MILL CONSUMPTION OF APPAREL WOOL, TOTAL DISPOSABLE INCOME OF INDIVIDUALS, AND CONSUMERS' PRICE INDEX, 1929–46

Year	Mill consumption of apparel wool, scoured basis[1]	Total disposable income of individuals[2]	Consumers' price index[3] (1935–39 = 100)
	(millions of pounds)	(billions of dollars)	(per cent)
1929	253	79.6	122.5
1930	201	70.7	119.4
1931	238	59.6	108.7
1932	189	45.6	97.6
1933	246	44.5	92.4
1934	167	51.0	95.7
1935	319	56.3	98.1
1936	300	65.2	99.1
1937	274	69.2	102.7
1938	220	62.9	100.8
1939	293	67.7	99.4
1940	310	72.9	100.2
1941	509	88.7	105.2
1942	561	110.6	116.5
1943	603	124.6	122.7
1944	577	137.4	125.5
1945	589[5]	139.6	128.4
1946	620[5]	144.5[4]	139.2

[1] *Bulletin of National Association of Wool Manufacturers, 1945*, p. 126.
[2] Department of Commerce.
[3] Bureau of Labor Statistics.
[4] Preliminary.
[5] Bureau of Agricultural Economics.

[22] The writer does not wish to imply that consumption of wool will return to the prewar income-consumption pattern. "Normal" should be interpreted only as a standard of comparison. Other factors such as the increase in population, shifts in income distribution, development of mixed fabrics, and new uses for wool must be taken into account.

[23] On the basis of a subsequent analysis made by the writer, it was found that estimated expenditures for wool clothing in 1946 were 15 per cent above the amount which would have been spent if the prewar relationship of expenditures for wool clothing to total consumer expenditures had been maintained. Paradiso's analysis comparing actual retail sales of men's, women's, and family apparel stores with calculated sales based on sales-income relationships, showed that in the first half

in early 1947 was at an extremely high level, compared with average consumption of the prewar period, and *maintenance of this accelerated rate of mill consumption for wool will depend largely upon consumer real incomes and how they are spent.* Consumption of wool is likely to drop unless consumers continue to spend as large a percentage of their incomes on woolen goods as they did in 1946. But in view of the heavy mill consumption and rising commercial inventories, it is unlikely that the 1946 level can be maintained unless prices are substantially reduced or unless woolen textiles replace other types of fabrics. Also, synthetics will probably offer increasing competition to wool as new technological developments occur in the structure, design, and manufacture of fabrics and textiles.

VIII. *Prospects for U. S. Production and Imports, 1947*

A further decline in domestic production of raw wool may be expected in 1947. According to the U. S. Department of Agriculture, "On the basis of the number of stock sheep on January 1, 1947, and past relationships between sheep numbers and sheep shorn, and assuming average weight per fleece equivalent to the 1935–44 average, shorn wool production for 1947 may be about 255 million pounds."[24]

Imports in 1947 are expected to average below the 1946 level because of lower mill consumption resulting from decreased demand for many woolens, and reduction of inventories of foreign wool held by mills if consumption of foreign wool is diminished in 1947.[25] However, since the demand for fine wools is more than for medium and coarse grades (which are in much larger supply than fine grades), 1947 imports may be 300–500 million pounds above the 1935–39 average annual net imports of 86 million pounds.[26]

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of 1946, sales in men's clothing and furnishings stores were 11 percent above sales that could have been expected on the basis of the prewar relationship of sales and the disposable income of individuals. Actual sales in women's apparel and accessory stores were 50 percent higher, and in family and other apparel stores actual sales were 18 percent above the prewar relationship. Since these stores carried many kinds and types of apparel for various uses, including cotton, rayon, and the like, and there are other factors involved, comparisons with the data in Chart III should not be made. See Louis J. Paradiso, "Retail Sales and Consumer Income Since VJ-day," *Survey of Current Business*, October 1946, pp. 10–17, especially Table II and Chart V. Also, see Charles D. Hyson, Savings in Relation to Potential Markets, *American Economic Review*, December 1946, p. 901.

[24] U. S. Department of Agriculture, Bureau of Agricultural Economics, *The Wool Situation*, March 1947.

[25] *Ibid.*

[26] *The Livestock and Wool Situation*, December 1946.

IX. *Prospects for World Production, 1947*

World production of wool in 1946–47 is not expected to vary much from 1945–46.[27] However, production of fine wools may be below the prewar average, while production of medium grade wools is expected to be above the prewar level. Because of appreciable sheep loss from drought, production in Australia and South Africa, the principal foreign fine wool producing countries, in 1946 was about 4 percent below the 1934–38 average production of 1,234 million pounds, and 18 percent smaller than the 1941 record. In New Zealand and South America, which produce medium grade wools, production in 1946 was close to the wartime peak. Production in these countries is expected to equal the 1945–46 production of 1,110 million pounds.

X. *Prospects for World Consumption, 1947*

Since considerable progress has been made in rehabilitating textile industries in western Europe during the past year, consumption of wool there may be expected to continue to gain. Purchases by France (once the largest manufacturer of wool products in Continental Europe and the world's third largest consumer of wool prior to the war) and Belgium in 1945–46 were equivalent to more than their annual consumption at the 1934–38 rate.[28] The Belgian wool textile industry has probably made the greatest postwar recovery. Production of yarns and fabrics had regained the 1938 level by July 1946, and in December 1946 production, as a whole, was reported to be 50 percent above the prewar rate. Italy has also made appreciable strides in rejuvenating its woolen industries. Shortages of fuel and power are still restricting production in Western Europe, but the principal difficulty appears to be shortages of skilled labor.[29]

Increased consumption in the United Kingdom and on the Continent, together with the reduction of world production in prospect, will lower the accumulation of world stocks of wool in 1947 and may, within a few years, bring about some reduction of the surplus.[30]

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[27] *The Livestock and Wool Situation*, September 1946.

[28] In one particular raw apparel wool sale late in October 1946 involving 205,000 bales of wool in Sydney, Brisbane, and Newcastle, French buyers obtained about 80 percent. *Journal of Commerce*, November 13, 1946.

[29] *The Wool Situation*, March 1947.

[30] Consumption in the United Kingdom should continue to increase as additional labor becomes available. During the war, consumption of wool by civilians in the United Kingdom averaged only 85 percent of prewar; thus, future needs for clothing and woolen garments are appreciable. Moreover, the United Kingdom will seek to regain its share of the world wool market. Consumption of wool in the United

The JO originally expected that *if total world consumption of apparel wool increased to a level 12 percent above prewar, it would require approximately 12 to 13 years (from mid-1945) to dispose of existing stocks and new clips, at the estimated rate of future production*, despite the fact that in both the United States and foreign countries sheep numbers have been appreciably reduced from the high wartime levels. Achievement of such a level of consumption would require sustained world purchasing power at a high level, lower prices for wool to encourage consumption, and extension of long-term credit to needy customers.

The JO will exert considerable influence over the marketing of three-fourths of the world's export supply of apparel wool. Much of the five billion pound world stock pile of apparel wool resulted from the sharp rise in production, mostly in the Southern Hemisphere countries, in response to higher prices during the early war years. Of this huge carry-over which will tend to act as a buffer against a sustained price advance of wool, about 2,600 million pounds were owned by Government organizations and of this total the British Government owned 81 percent, whereas the United States Government held 19 percent. The policy of the JO to purchase a portion of the new clips, which do not sell at "prescribed" prices, will offer support to world prices.

XI. *JO Program vs. CCC Program*

With the resumption of the wool auctions in Sydney and in London in September 1946, prices of Dominion fine wools advanced to around the same level as the CCC *purchase* prices for comparable domestic wool, largely as a result of heavy Continental European buying, and continued demand for fine grade wool in United States markets. Prices of fine quality wools in Australia in early March 1947 were 30 to 40 percent above last season's British "issue" prices. Wool prices in the South African and South American markets were

Kingdom in the 1945–46 season averaged roughly three-fourths of the 1934–38 average consumption. Consumption in the Southern Hemisphere countries and in Canada may decline from their wartime peaks but remain above the prewar consumption levels.

It is hard to determine what proportion of the increased wool consumption attained in the United States during the past six years will be retained in the future. Before the war, the per capita consumption of wool in the United States was only half that of the United Kingdom. Consumption of apparel wool in the United States for 1947 has been estimated by the U. S. Tariff Commission at 750 million pounds, grease basis. This is 27 percent above the prewar level, and would involve annual important of 300 million pounds of foreign wool.

reported to be 20 to 30 percent above those of last season. Because of the heavy demand for fine quality wools and the limited quantity of such wool in the carry-over, prices of foreign fine wools were substantially higher than the JO support-prices, which were considered relatively low on the basis of market conditions.

Total offerings of wool in the United Kingdom from September to December 1946 (practically all of which was sold) were larger than the July-June sales in the years 1934–38, and are expected to increase in the last half of the current season. Combined offerings at all places from the JO stocks were expected to aggregate over a million bales in the 1946–47 season (in addition to the new production of the three Dominions). Commercial buyers have bought practically all the wool offered. It has not been necessary for the JO to purchase fine wool in any considerable quantity,[31] but there has, however, been a moderate accumulation by JO of average and inferior style crossbreds out of the current clip in New Zealand.

The policy of the JO to endeavor to "stabilize" prices for Dominion wools by purchasing new clip wools which failed to find buyers at the "prescribed" prices, by auctioning wools from their own stocks, and new production, and hence regulating the flow of wool to the world market, is more flexible and offers more commercial "freedom" than the CCC program, which has simply placed a price "floor" under wool with little or no regard to current market conditions.

The achievement of a balance between supply and demand for wool has been complicated by the two different world selling agencies—the JO and the CCC—employing different price policies. The JO has appeared to pursue a policy of encouraging wool consumption in the light of consumer purchasing power, market conditions for the various types and grades of wool, and prices of competing fabrics. The outstanding difference between the JO and the CCC price policies, however, is that the former agency has ostensibly taken consumers into account in deriving its price schedule, whereas the CCC has seemingly neglected to recognize the importance of the demand for raw wool. The JO not only recognized the wool producers' interests, but has given consideration to wool buyers in an effort to prevent an unwieldly supply from accumulating. The CCC wool policy, on the other hand, has had little (if any) regard for the effects of its shortsighted program on the disposition of the

[31] *The Wool Situation*, March 1947.

wool supply. The consequences of this policy upon the domestic wool supply situation have been already demonstrated, especially since the CCC raised selling prices in December 1946. Moreover, it might reasonably be assumed that the disparities between domestic and foreign wool prices have significantly influenced price policy decisions of the JO in recent months.

The CCC selling prices for domestic wool have been related to the parity index, which may be contrary to conditions developing in the wool and textile markets. Hence, the prices of domestic wool have been set by legislation, while the price of the remainder of the world wool supply is controlled by the JO. *For the next year at least, wool prices will depend on the actions taken by the respective governments which have monopolistic control over the world wool market.* The history of the ill-fated Federal Farm Board of 1933 in this country should provide an illustration of the pitfalls to be avoided in commodity control schemes of this nature.

XII. *Prices and Market Prospects for Wool*

Agricultural prices are commonly known to be more sensitive than industrial prices (or prices paid by farmers used to compute the parity index). With a decline in the general agricultural price level (which is to be anticipated), it will become necessary for the CCC to cut selling prices of wool to prevent additional accumulation of stocks to levels which would have a depressing effect on future prices of domestic wool.

Production of competing synthetic fabrics will be encouraged unless the price disparity between these fabrics and wool narrows. Per capita consumption of wool fabrics declined about 30 percent from the turn of the century to 1946.[32] But, wool comprised about 11 percent of the total consumption of four textile fibers in the United States in 1945, compared with 9 percent in 1935–39. The importance of rayon, however, shifted from 8 percent of total consumption in 1935–39 to 13 percent in 1945.

It should be emphasized that the recent heavy purchase of wool following the resumption of auctions in Empire countries has made the *appraisal* of the world wool stock pile very difficult in terms of

[32] From brief of Woolen and Worsted Fabrics Group of the National Council of American Importers, Inc., with the Committee for Reciprocity Information, February 26, 1947, (Washington, D. C.). *Journal of Commerce*, February 27, 1947, p. 16.

quantity or value of wool. It is probable that purchases by France, for example, surpass her current requirements, and that much of the wool recently bought by France is being held in storage or was bought for other countries. Although wool purchases are heavy, it is doubtful whether mill consumption in some consuming countries is keeping abreast of these purchases; thus, the world inventories of raw wool are probably increasing. This would suggest that some of the buying in Australia, South America, and elsewhere may have been of a speculative nature.

A high backlog of demand for cotton, rayon, and woolen textiles as well as the raw commodity exists throughout countries of Continental Europe, the United Kingdom, and in Asia. Since these countries need credit to buy goods, it is important that prices be low enough to maintain a continuous export-demand.

The increases in prices of Australian fine wools during the early part of November reflected the heavy purchases of wool made by France and Belgium, partly financed by recently obtained credits. Whereas it may require many months to fill this demand, prices will largely determine the course of purchases. Of the three basic textile fibers (cotton, rayon, and wool), wool is in better supply throughout the world than the other two. United States exports of wool products in 1946 far exceeded prewar levels. As cotton and rayon are in shorter supply, the size of the potential export market for these fibers will be larger than that for wools.

Foreign wool prices will probably begin "easing off" before domestic prices decline because of the greater vulnerability of foreign wools to world market conditions. While supported by high levels of employment, consumer purchasing power, and by the Government's support-price program, prices of domestic wool will be adversely affected as higher quality foreign wools are sold in order to build up dollar exchange, as consumer expenditures shift to other goods, and as prices of other substitutable fabrics decline.

Thus, although wool consumption in this country appears to be at an untenable level in relation to income, and both domestic and world carry-overs are excessive, the price outlook is dominated by Government policies rather than by market forces. To the control exercised by the CCC, buyer of the whole domestic clip, must be added the control of the JO, which is not, like the CCC, bound by legislative restraint and may be expected to pursue a price policy aimed at gradual liquidation of the surplus.

XIII. *Cost of CCC Program*

The CCC had a "loss" of $37,466,659 on its wool merchandising program in the 45 months between April 1943 and December 31, 1946, when the CCC bought 1,272,819,513 pounds of domestic wool costing the CCC $700,787,726 (excluding storage charges now running about $330,000 a month). During this 45-month span, 809,584,800 pounds of the CCC wool stock pile were sold for $451,559,947. The CCC stock pile of about 455 million pounds was valued at roughly $225,000,000 at the end of 1946.

Approximately $2,065,000 of the total losses could be attributed to the reappraisal program of the CCC, which now holds a reserve of $55,000,000 for anticipated additional losses in the liquidation of CCC stocks, assuming a loss of 10 cents a pound.[33] This would make the total CCC wool losses over $92,000,000.

If this sum is added to the increased cost of woolen textiles to consumers, as an incidence of the tariff, the total subsidy to wool producers would be substantially higher.

XIV. *Suggested New Policy*

Although the "floor" under prices of wool may have a stabilizing influence, it would be desirable to inaugurate a policy which would make practicable a gradual removal (to protect growers from sustaining losses) of present CCC subsidies by making subsidy payments depend upon improved flocks, grading practices, and finer quality wools (while income and employment are still relatively high in the United States), which could compete with foreign wools. Unless wool textile manufacturers in the United States can obtain wool at prices at or near the world market level, they may not only have difficulty finding markets abroad but also at home.

Although there are many complications in measuring the degree of effectiveness of the tariff[34] on raising the prices of domestic wools substantially above free world prices,[35] the influence of the other policies of the Government has been to accentuate the maladjustments in the wool industry. Hence, the effects of these policies

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[33] From testimony of Harry E. Reed, Director of the Production and Marketing Administration, U.S.D.A., before the Senate Agriculture Committee, March 5, 1947. *Daily News Record*, March 6, 1947, p. 1.

[34] On balance, it seems that the significance of a reduction in the tariff on raw wool depends fundamentally upon the extent to which imports increase, the price falls, and the exchange of goods is intensified.

[35] See Haldor R. Mohat, *The Tariff on Wool, op. cit.*

should be reexamined and the tariff policy appraised in the light of present conditions, if a balance between wool production and consumption is to be attained and our domestic trade policy made compatible with our announced aims on international trade.[36] Lower tariffs on imported wool, however, might weaken the Government's support-price program. Gradual elimination of the subsidies, moreover, may force some reduction in the size of the domestic wool producing industry because of competition from foreign wools which have a comparative advantage in the world market.

Many of the elements of a sound solution of the world wool problem center in the United States. The United States has long been a reluctant importer, as illustrated by our high tariff policy, a wartime restriction on the use of foreign wool, and support-prices of domestic wool at artificial levels. Even in the interests of the strong political blocs of organized wool growers changes in the United States' wool policy are long overdue.[37] How can the problem of disparity between potential production and consumption of wool be solved? The answer lies in expanding world wool consumption while instituting a program to adjust production to consumption.

Negotiations have been underway for Australian producers to ship wool (less desirable types) to Japan in exchange for silk shipments and credits to buy other goods, on a basis somewhat similar to CCC arrangements to ship cotton to Japan.[38] Japan, the world's fifth largest prewar purchaser of wool, annually consumed about 200 million pounds, grease basis, and usually had an adverse wool trade balance.[39] Such a program is designed to bolster the sagging Japanese economy and reduce costs of United States occupation.

On balance, the CCC subsidy program for wool has apparently encouraged the perpetuation of maladjustments, which over the long-term can neither benefit the producer nor the consumer of wool. Some price pegging plans for farm products may be vital in the interest of short-run economic stability, but we should pursue

[36] See T. W. Schultz, *Agriculture in an Unstable Economy*, McGraw-Hill, 1945, p. 261.

[37] See Hearings before the Subcommittee on Agriculture and Mining; Special Committee on Postwar Economic Policy and Planning; Postwar Agricultural Policy; 78th Congress, second session. Statement by J. S. Davis, p. 1706.

[38] *New York Times*, January 25, 1947, and February 12, 1947.

[39] The Japanese war machine probably consumed a major share of this wool. The following countries rank from first to sixth in order of importance as net importers of raw wool in the period 1934–38: United Kingdom, France, Belgium, Germany, Japan, United States. See study on world movements of raw wool, by Dr. Gerda Blau, International Wool Secretariat, New York.

a price policy which seeks to counteract cyclical movements in the price system and not to perpetuate secular maladjustments.[40] Hence, an adequate price policy for wool should prevent chronic surplus and mitigate ill effects of weather and cyclical surpluses. The Wool Study Group organized last year should be well qualified to conduct a comprehensive and bold international investigation of world wool problems. Export markets for wool may be expanded as foreign exchange and credit become available through such facilities as the International Bank and the International Monetary Fund.

It is obvious that the CCC price policy has not been successful in marketing the domestic wool clip. A new and better policy is needed. Eight bills (three in the Senate and five in the House) designed to continue the support-price program for wool and to establish new regulatory measures for wool, were introduced between January 3 and March 18, 1947.[41] The new O'Mahoney bill was substantially like the earlier one (S. 2033). The Barrett and the Hill bills, however, would set up import quotas for raw apparel wool. Secretary of Agriculture Anderson endorsed the bill introduced by Mr. Hope, Chairman of the House Committee on Agriculture,[42] permitting the Department of Agriculture to charge fees up to 50 percent of the *ad valorem* tariff rates on foreign wools, cotton, and other agricultural commodities when the Secretary of Agriculture finds that imports are threatening the domestic support-price program. Nevertheless, this bill would prohibit the assessment of import fees above the usual customs duties if they were in "contravention of any treaty or international agreement to which the United States is or hereafter becomes a party." The Herter, Saltonstall-Lodge bills (approved by the wool trade)[43] would provide for Government continued support of domestic wool prices to December 31, 1948, at 90 percent of parity, and would permit the CCC to sell its existing wool stocks in competition with imported wool. Seven of the bills would permit the CCC to sell its wool below the parity price, while four of the bills would support wool prices at 90 percent of the so-called "comparable" price.

[40] See Charles D. Hyson, "A Price Policy For Agriculture," this JOURNAL, November 1945.

[41] S.103 (O'Mahoney bill, January 8); S.814 (Robertson bill, March 7); H.R. 63 (Granger bill, January 3); H.R. 1890 (Barrett bill, February 12); H.R. 2318 (Hill bill, February 28); H.R. 1825 (Hope bill, February 10); H.R. 2401 (Herter bill, March 6); S.917 (Saltonstall-Lodge bill, March 18)—80th Congress, 1st session.

[42] *Daily News Record*, March 13, 1947, p. 1.

[43] *Ibid.*, March 7, 1947, p. 5, *The Commercial Bulletin*, March 22, 1947, p. 1.

The case against import quotas should be a familiar one by now. An import quota on wool would tend to accentuate maladjustments between production and consumption by encouraging increased use of lower priced synthetic fibers. Import quotas, by fixing the volume of trade, may be more restrictive than tariffs, and invite retaliatory measures by countries whose trade was affected. They would contradict our international trade program designed to expand consumption and production.

Experience with two-price plans before the war merely aggravated the surplus problem. The CCC cotton program is a good case in point. Unlike the long upswing of business activity following the accumulation of large surpluses during most of the Thirties, the present market outlook has quite a different view. Confronted with the prospects of lower prices for other commodities which have been more profitable than wool to produce, coupled with an anticipated decline in sales of non-durable goods such as woolen apparel and textile fabrics, a support-price program for wool without provisions for production adjustments offers little guarantee of correction of the maladjustments in the domestic wool industry. A bold, impartial, and comprehensive study might be made of this problem.

Substitution of the "comparable" price formula for the present parity formula would have raised the parity price of wool from 40.4 cents to 50.4 cents in mid-February 1947. The wide gap between the parity ratio for wool and for all farm products (Table III) is explained by the fact that the average base price for wool in August 1909–July 1914, was only 18.3 cents. Hence, wool producers seek a new parity standard giving them higher support-prices.

The parity principle in the case of wool and many other farm commodities was completely abandoned in the Price Control Act of 1942.[44] Provisions in the Robertson and O'Mahoney bills authorizing support-prices for domestic wool at the 1946 level or 90 percent of the "comparable" price (whichever is higher) until the end of 1948 would continue this practice; however, the latter bill would support prices at an indefinite level until the end of 1950. The original concept of parity was to provide "fair exchange values" for farm commodities.[45] However, the parity formula based on a relationship of some thirty-five years ago does not adequately reflect

[44] See John D. Black, *Parity Parity Parity*, Harvard Committee on Research in the Social Sciences, Cambridge, Mass. (1942) pp. 38, 39, 64, 65, 123, 146.

[45] *Ibid.* Ch. V. Also, Charles D. Hyson, "A Price Policy for Agriculture," *op. cit.*

changes in cost of wool production, distribution, and market conditions since then. Moreover, computation of the purchasing power parity of wool necessitates calculation of a weighted average price for all types of wool, which is complicated by the wide variation in types and grades.

It may be expected that a compromise bill will be passed by Congress authorizing the CCC to sell its wool stocks below parity. The CCC should not adopt a program of dumping wool stocks on the market, but rather develop a system of orderly liquidation of the carry-overs whereby wool stocks put upon the market would be prorated on both a grade and quantity basis over a period of time, according to market conditions. The CCC may be expected to work out selling price schedules based on the comparative values for wool and at a price that will move the supply. A revaluation of some CCC held wool would be necessary because of shifts in demand for various types since 1943, and much of the wool is of the defective type. A merchandising program could be most effectively devised by a committee composed of representatives of the Department of Agriculture and the wool handlers and dealers. The CCC wool selling price schedules should be closely integrated with the "reserve" prices of the JO, to help ensure price stability in the world market. But, some difficulty may be encountered because of the complexities of determining comparable grades, *type by type*, between foreign and domestic wools.[46] The excellent results obtained by a return to the auction method of marketing Dominion-produced wools may encourage the reappearance of the prewar wool auction system in the United States.

Consideration might be given to the creation of a *temporary* Domestic Wool Organization with representation of wool producers handlers, and manufacturers to serve as a consultative committee assisting in the computation of the price schedules for domestic wool within the existing framework of the CCC. Its activities would be subject to periodic review by Congress. The Domestic Wool Organization would help undertake the responsibility of the orderly marketing of wool and gradual liquidation of the surplus. The price policy should be so devised that it would necessitate a minimum of interference with the "free" market mechanism so that the surplus of wool does not become chronic.

[46] Preferences for types of wool vary widely among various wool scourers and manufacturers of wool fabric, hence the price differentials between foreign and domestic wools frequently are not uniform.

The International Wool Secretariat in London (a British Commonwealth organization), which has done useful technical and promotional work, might be extended to include wool-producers organizations in the United States. *Our Government's Wool Marketing Improvement Program (to make domestic wool more acceptable to buyers) was a step in the right direction, but with this program needs to be a means to improve flocks and wool.* Since some of the grazing lands (particularly in areas of the western states) may need to be shifted away from producing sheep to more profitable alternative uses (as occurred during 1942–46) it will be necessary that measures be taken to prevent or alleviate any serious dislocations which may arise due to difficulties of finding alternative employment. This may prevent adjustments from becoming affected by the free play of market forces as quickly as the circumstances require; thus, a *limited* period of transition for orderly adjustments should be designed to promote a shift away from uneconomical wool production into new and productive occupations. Growers should be protected from financial loss while the abnormal carry-over is being liquidated. Growers will probably never be in a better financial position to have a constructive adjustment program instituted than at present.

The policy of indefinite subsidation of wool growers without regard to incentives for improvements of breeding better flocks, raising the quality of wool, perfecting the sorting, grading and preparation of wool for marketing, lowering costs of production (and hence make wool available at lower prices to consumers), is not only an uneconomical use of resources and hence a social waste, but such a policy is not compatible with an expanding, dynamic, and healthy economy. Development of a sound domestic wool policy would contribute greatly not only to evolving an effective international wool policy but to meeting the pressing problems of raw materials in general.

Addendum

Since this paper went to press, the Senate passed a revised and amended version of the original Robertson bill, which in its present form, guarantees to support domestic wool prices at the 1946 level until the end of 1948, and permits that the CCC may "dispose of any wool produced prior to January 1, 1949, at prices which will permit such wool to be sold in competition with imported wool." The bill originally provided that not less than $130 million shall be made

available to support the price of wool produced in the calendar years 1947 and 1948. Recognizing the difficulty of maintaining a fixed *price for domestic wool at approximately the wartime peak without additional restrictive measures, the House Committee on Agriculture approved an amended bill authorizing the Secretary of Agriculture to impose import fees up to 50 percent* ad valorem *on imported wool, including a "floor" tax on inventories of imported raw wool at a rate equal to the amount of the import fee invoked.*

Imposition of import fees, coupled with a high support-price for domestic raw wool, would: (1) tend to disrupt cost structures of textile manufacturers and raise prices at a time when living costs are already inflated; (2) result in supplanting certain wool marketing operations ordinarily conducted by private enterprise, and would practically assure the Government's participation as a principal if not the only buyer of the domestic clip; (3) in view of a proable lower price level in the ensuing two years prove costly to the taxpayer. The institution of an import fee on wool may have serious consequences far beyond the limits of the domestic raw wool industry itself. It may jeopardize our Reciprocal Trade Agreements Program, and threaten the successful outcome of the International Trade Conference in Geneva, which was largely sponsored by the United States.

Although the domestic farm value of wool was only $118 million in 1946, "protective" legislation has had the effect of substantially increasing the cost of wool clothing on which American consumers spent an estimated $4.8 billion in 1946.

An additional duty on wool would weaken Britain's ability to improve her balance of payments position with us by exchanging wool for dollars, and hence would tend to contradict the intent of the Anglo-American Financial Agreement.

REPRODUCTION AND REPLACEMENT OF FARM POPULATION AND AGRICULTURAL POLICY

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THE natural increase of American farm population, measured in absolute numbers, has been so consistent and so large during the life span of our country, that few people have taken cognizance of factors that are now working toward a stationary, and, in some areas, a declining farm population. The knowledge that there has been a steady decline in the fertility of farm families during this prevailing period of growth has been either obscured or overshadowed by two positive forces operative over this historical period. The first of these was the heavy increment of immigrants of child-bearing age during most of the nineteenth century and the first two decades of the twentieth. This migration provided a steady flow of young and middle-aged adults to augment the total number of child-bearing couples. The resulting disproportionately large fecund population of America caused a birth rate in excess of that prevailing in northern and western Europe in the same period, and greatly in excess of that which would have obtained in the United States without the increment of child-bearing couples. The second positive force was the rapid impact of modern medical science on mortality. This latter factor has been especially influential in reducing the infant mortality rate, but it has also made life safer for all ages. Both of these have resulted in a stimulation of the natural growth of our population.

As a consequence of seemingly unlimited reproduction potentialities of our farm population, rural sociologists and agricultural economists have, wittingly or unwittingly, given support to a belief in the inevitableness of the phenomenon of farm population increase, and have been rather proud to be a part of the "seed bed of American population." Few have ever given expression to the result of the impact of culture on fertility and how the processes of secularization combine to reduce fertility. Furthermore, there seems to have been all too little recognition of the fact that there are just as great differences in family fertility *within* the farm population, as there are *between* farm and urban inhabitants. In the light of facts which will be presented we should specify that certain segments only of our farm population have an excess of fertility in the sense

that they are rearing children who are surplus to agriculture and who migrate to the cities and who thus contribute to their growth, to offset the low fertility of urbanites. Furthermore, the high fertility segment is growing smaller in numbers as measured by each succeeding recent national census.

We are not going to take the position that America should be alarmed over this declining trend, but neither do we wish to ignore cultural change that is causing farm family fertility to move inexorably toward the same level of low fertility that is characteristic of urban populations. We also strongly assert that American agricultural policy can be realistic and equitable only as it takes full cognizance of the real trends in population.

The following analysis is therefore concerned with testing the hypothesis that farm family fertility approaches that of urban families in direct proportion to the reduction of their respective cultural differences. In other words, fertility patterns are in themselves a mark of status in a culture system and as rapidly as other factors, such as income, mobility, religion, nationality, urbanization, et cetera, become equal, the greater the similarity in fertility behavior.

To test this hypothesis and to explore the contributing factors, we have selected the farm population of four Midwestern states: Minnesota, Wisconsin, Iowa and Illinois. The four states were chosen to give us a historical cross-section in our national cultural development in the belief that on a continuum of secularization each of the four states can be located on a definite point on the scale, with Minnesota representing the newest of the populations and Illinois the oldest. In this fashion the data of the major hypothesis will be exhibited in four broad separate stages of the acculturation process. In a further attempt at refinement of the measurements, each of the states was sub-divided into economic quartiles, making possible comparisons between the upper and lower quartiles of the respective states. It has been assumed that this subdivision according to one economic factor will be valid historically and sociologically as well as economically, and therefore, in accordance with the theory of cultural change we may expect as great or greater differences between the quartiles within a state than will necessarily be the case for inter-state comparisons.

By contrasting data from four states where the highest economic quartile of counties forms a relatively homogeneous geographic

area, and where the lower quartiles are at opposite extremes of the total geographic region under analysis, we have an heterogeneous area in which it should be possible to uncover many of the causes of declining fertility. In the total universe studied we will find many recognizably different strata or groups of families, many varying patterns of farming, differences in income and social customs. It is from this extensive and heterogeneous universe that we hope to find the conditions related to high fertility, those conditions associated with low fertility, and, perhaps, the conditions associated with a stationary population.

Selection of Data and Method Employed

In casting about for the *matériel* of the study, letters were written to the Bureau of Vital Statistics of the respective states in hopes that data for births and deaths over the historical period 1920 to 1940 could be secured, classified according to sex, color, age of mother, and rural and urban residence. We were disappointed in the replies, and it was evident that any refined measures of differential fertility would necessitate a reworking of the original schedules in each state office. That procedure, of course, was out of the question. Only for the state of Wisconsin were we able to secure a limited amount of data to permit some refinements of the tabulations. Otherwise, the data have come from published volumes of the Federal Census.

The economic index used to segregate the upper and lower quartiles of counties in each of the states consisted of the value of land and buildings per acre as reported in Vol. 1, *Agriculture, Census of 1940*.[1] In selecting the counties for each quartile, those having a smaller proportion of farm population than the state average were eliminated.

We attempted to make the field of study that of farm family

[1] The selection of this index of economic status was made after the available economic indices were tested for association. It was found that the predictability of economic status for this index was highly correlated with crop acreage per farm, gross income per farm, and plane of living index of Harold T. Christensen, *Population Pressure Among Wisconsin Farmers*, unpublished Ph.D. thesis, University of Wisconsin, 1941, pp. 117–120. Our choice was finally motivated by the relatively greater accessibility of the index and a belief that it was more uniform for all states than the other possible choice. In Wisconsin, where our personal knowledge of the counties is greatest, it was found that the lowest quartile coincided highly with the designated "problem area" of the state, and the upper quartile covered the popularly known prosperous farm counties.

fertility for the three census periods 1920, 1930 and 1940, but encountered difficulties because of the limitations of the census data. Even though the division between farm and rural population was made by the Bureau of the Census in 1920, the published content of the farm population statistics varies in each of the succeeding census periods, making it impossible to draw true farm family comparisons for the three periods. Definitions of "rural" will be encountered in appropriate places in the manuscript. We have disregarded the under-registration of all age groups because there is not sufficient agreement concerning the necessary correction factor.[2]

In this study of fertility we have employed the index of female net reproduction for all states, and, for Wisconsin only, the female net reproduction rate and the male replacement rate.

The method of computing the female net reproduction rate is too well known to need elaboration. Inasmuch as we were able to secure rural births by age of mother for the separate counties of Wisconsin for only 1940, the rate computed by the direct method is given below.

The index of net reproduction is useful when data for births by age of mother are not available. Further, it has a value intermediate between the gross reproduction rate, so commonly employed, and the net reproduction rate.

Obviously, if complete data are not available, and for practical purposes they never are, substitute replacement rates have to be computed. The index of net reproduction is affected by birth and death rates of children under five years of age, by disturbance of the age composition of these children because of migration, by under-enumeration of children under 5 years, and by approximations in the assumptions on which it is based.[3] In spite of the limitations the index of net reproduction appears to be about as accurate an approximation of the true net reproduction rate as it is possible to compute.[4]

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[2] The correction factor of 1.0460 for the under-enumeration of white children under 5 years of age as employed by the Bureau of the Census in its estimate of net reproduction for 1940, seems to us unduly high for the Midwest and not in agreement with the opinion of staff members of some of the midwest state vital statistics offices. It would be penalizing those states if we apply the correction factor based on the national average.

[3] Cf. Margaret J. Hagood, *Statistics for Sociologists*, Reynal and Hitchcock, Inc., New York, 1941, p. 894.

[4] Glass makes the following comments on this point: "It may thus be concluded

In computing the index of net reproduction it was necessary to first calculate a permanent replacement quota for each of our populations. The quota turned out to be relatively inelastic, as statisticians have pointed out. For example, we found it ranged from a value of 356 to 369, or a range of only 3.6 percent, which in turn caused a maximum variation of only 0.5 percent in the index of net reproduction. Nevertheless, a permanent replacement quota (the ratio of children under 5 to 1,000 women ages 15–44 necessary to maintain a stationary population) was computed for each region in which a state was found as well as for each decade. The sex ratio we used was based on children under five in each unit of universe, as for example, Wisconsin upper quartile counties, rural-farm, 1940. Survival rates were based on United States Abridged Life Tables 1930–39, released by the Bureau of the Census in 1942.

The farm male replacement rate is "the change, in any particular year, in the number of persons in the productive age groups due to the survivals from births in past years to the first year of productive age, less the deaths within the productive ages during the current year, less the number who pass annually beyond the last year of productive age."[5] We chose the years between 20 and 60 as the productive years, thinking the former is the year that boys in Wisconsin should enter farming and the latter as the age when operators normally retire from active operation of the farm. Others might have chosen the ages 18 to 65 as Woofter did, but the choice in the years does not seriously alter the calculated rate. Mortality rates for ages 20 to 60 were taken from the United States Abridged Life Tables, 1939–41, and only the white male rates were employed. The same death rates were applied to calculate the replacement rates for 1940 and 1950. The net migration rates for specific age groups for the decade 1930–40 were employed to calculate the 1940 rate, and the same rate of migration was assumed to continue for the decade 1940–50 to calculate the 1950 rates. The assumptions employed are open to the usual criticism to which all assumptions are subject.

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that, in practice, substitute net reproduction rates, *or index of net reproduction as others call the rate*, will provide the most accurate estimate of reproduction trends when the distribution of births by the age of mother is not given." D. V. Glass, *Population, Policies and Movements in Europe*, Oxford Press, London, 1940, p. 398. (Italics ours.)

[5] T. J. Woofter, "Replacement Rates in the Productive Ages," *Milbank Memorial Fund Quarterly*, Vol. XV, No. 4, October 1937, New York.

Results of the Analysis

Except for a slight upsurge in 1940 in Minnesota and Iowa, there has been a steady decline in the rural birth rate among Midwestern farm families the past three decades. The highest crude rate of 23.3 prevailed in Minnesota in 1920, and the lowest rate of 16.2 prevailed in Illinois in 1940. The influence of immigration upon population growth in 1940 was a minor one in contrast to earlier years. This change has in turn altered the age and sex composition of the population. Mortality, especially infant mortality has been radically lowered over this span of years. To allow for the changing influence of age and sex composition and mortality, we turn to the index of net reproduction.

TABLE 1. CONSTRUCTION OF A STATIONARY WHITE POPULATION OF 1,000,000 FOR IOWA, RURAL FARM UPPER QUARTILE, 1930

Age groups	(a) nL_{z_m}	(b) $\frac{1}{nL_{z_m}} = .0862029$	(c) nL_{z_f}	(d) $\frac{1}{nL_{z_f}} = .0826907$
15–19	438,960	37,840	449,310	37,154
20–24	431,550	37,201	442,090	36,557
25–29	422,910	36,456	433,120	35,815
30–34	413,560	35,650	423,680	35,034
35–39	402,330	34,682	413,130	34,162
40–44	388,470	33,487	400,950	33,155
TOTALS	2,497,780	215,316	2,562,280	211,877
Under 5	459,250	39,589	466,830	38,603
All Ages	5,785,580	498,734	6,061,940	501,266

(a) Number of white males in each age group according to United States Abridged Life Tables 1920–29.
(b) Number of white males in stationary million according to the sex ratio of the Iowa rural farm white population in 1930.
(c) Same data for white females as in column (a).
(d) Same data for white females as in column (b).

Following Hagood[6] and Glass,[7] Table 1 illustrates the construction of a stationary white rural farm population in Iowa for 1930, Upper Quartile, basic to the computation of the index, which procedure was necessary for each of the states and sub-groups studied.

With a rural farm white sex ratio of 1.042474 for Iowa in 1930, calculating the value of $L_{z_m 1}$ we have:

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[6] *Op. cit.*, pp. 883–888.
[7] *Op. cit.*, pp. 387–399.

$$L_{z_m}{}^1 = \frac{1{,}042{,}474}{1{,}042{,}474(5{,}785{,}580)+6{,}061{,}940} L_{z_m}$$

$$= .0862029 L_{z_m}$$

and

$$L_{z_f}{}^1 = \frac{1{,}000{,}000}{1{,}042{,}474(5{,}785{,}580)+6{,}061{,}940} L_{z_f}$$

$$= .08269071 L_{z_f}$$

The observed effective fertility ratio, for the rural farm white population, Upper Quartile, of Iowa for 1930, computed from the data of the Census, is

$$\frac{28{,}770}{58{,}246} \times 1{,}000 = 493.9$$

Continuing the arithmetic, the permanent replacement ratio becomes:

$$\frac{78{,}192}{211{,}877} \times 1{,}000 = 369.0.$$

The index of net reproduction being the ratio of the effective fertility ratio to the permanent replacement quota, we have the final result of

$$\frac{493.9}{369.0} = 1.34.$$

Continuing the foregoing process the effective fertility ratio and the index of net reproduction for each state, and sub-group within the states, are shown in Tables 2, 3 and 4. The current definition of "rural" as used by the Bureau of the Census applies in these tables.

TABLE 2. INDEX OF NET REPRODUCTION FOR THE RURAL AND RURAL FARM WHITE POPULATIONS OF FOUR MIDWESTERN STATES AND NEW YORK, 1920*

Population area	Effective fertility ratio		Index of net reproduction	
	Rural	Farm	Rural	Farm
Minnesota	572.6	608.5	1.48	1.57
Wisconsin	563.5	598.6	1.46	1.55
Iowa	523.4	577.5	1.35	1.49
Illinois	503.5	521.7	1.30	1.35
New York	446.1	465.5	1.15	1.20

* See page 464.

TABLE 3. INDEX OF NET REPRODUCTION FOR THE RURAL AND RURAL FARM WHITE POPULATIONS OF FOUR MIDWESTERN STATES AND NEW YORK, 1930

Population area	Effective fertility ratio		Index of net reproduction	
	Rural	Farm	Rural	Farm
Minnesota	490.0	528.0	1.33	1.43
Upper Quartile	486.0	525.0	1.32	1.42
Lower Quartile	577.0	593.0	1.56	1.61
Wisconsin	496.0	525.0	1.34	1.42
Upper Quartile	464.0	492.0	1.26	1.33
Lower Quartile	534.0	519.0	1.45	1.41
Iowa	456.5	498.0	1.23	1.35
Upper Quartile	456.2	493.9	1.24	1.34
Lower Quartile	469.8	504.7	1.27	1.37
Illinois	435.9	460.5	1.18	1.25
Upper Quartile	437.2	471.7	1.18	1.28
Lower Quartile	483.9	498.7	1.31	1.35
New York	408.7	447.9	1.11	1.21
Upper Quartile	369.2	404.4	1.00	1.09
Lower Quartile	467.3	496.0	1.26	1.34

TABLE 4. INDEX OF NET REPRODUCTION FOR THE RURAL AND RURAL FARM WHITE POPULATIONS OF FOUR MIDWESTERN STATES AND NEW YORK, 1940*

Population area	Effective fertility ratio		Index of net reproduction	
	Rural	Farm	Rural	Farm
Minnesota	450.0	490.0	1.26	1.37
Upper Quartile	438.0	465.0	1.23	1.30
Lower Quartile	507.0	540.0	1.42	1.51
Wisconsin	443.0	467.0	1.24	1.32
Upper Quartile	413.5	440.0	1.18	1.24
Lower Quartile	482.0	490.0	1.33	1.37
Iowa	418.5	445.0	1.16	1.24
Upper Quartile	407.4	439.3	1.13	1.21
Lower Quartile	431.8	451.5	1.20	1.26
Illinois	388.2	410.1	1.07	1.13
Upper Quartile	378.5	392.5	1.04	1.08
Lower Quartile	432.0	454.0	1.19	1.25
New York	338.0	385.2	0.94	1.07
Upper Quartile	293.7	326.0	0.82	0.91
Lower Quartile	428.4	448.1	1.19	1.25

* Because the permanent replacement ratio is inelastic (see p. 461) and to conserve time, the ratio computed by Lorimer and Osborn for the white population of the United States for 1920 was used for the states in this study in computing the index of net reproduction for that same year. See Frank Lorimer and Frederick Osborn, *Dynamics of Population*, Macmillan Co., New York, 1934, p. 356.

From Tables 2, 3 and 4 it will be noted that of the 70 separate indices of net reproduction, only three are slightly out of line. In other words, starting with the highest rate, 1.61 (Minnesota farm, 1930, lower quartile[8]) in the newest of the states historically, the least advanced in the processes of acculturation, there is a straight line decline, with only a few minor fluctuations, until the state in the oldest point on the continuum of historical, economic, social and cultural processes is reached, New York with a rate of 0.82 in 1940. The rate of 1.61 in Minnesota is for the segment of counties in the lowest quartile economically of the farm population. The rate of 0.82 in New York is for the segment of counties in the highest quartile economically of the rural population. The two rates represent the opposite extremes on our cultural continuum. In the lowest extremity are located the families who are in the least favorable economic position.[9] Theirs is the area which is the newest on our historical scene, they are the families the farthest removed from cities in terms of mileage, they are the least mobile and have the fewest contacts with urban culture. As we proceed on the continuum from quartile to quartile within the farm population, and from the farm groups to the rural, and from Minnesota to New York, the index of net reproduction diminishes in value.

The data show clearly that the differences between the behavior of farm families and rural families, insofar as their fertility index reveals, are rapidly disappearing. For example, the farm families in the upper quartiles of the scales had differences of +.10, +.11, +.11, −.01, −.02 points in their indices compared to the total of rural families in the respective states in 1930, in 1940 these same differences dropped to +.01, +.05, +.04, 0, −.03. When the upper quartile farm families are compared to the upper quartile rural families in 1930, the differences are +.10, +.10, +.10, +.07, +.09; in 1940 the differences fall to +.04, +.08, +.07, +.06, +.11.

[8] Because the required census data were not available in 1920 to permit segregation of the states by counties, it was not possible to make exact comparisons by quartiles for this period. The difference in the index of fertility between the lower quartile of the Minnesota farm population and the state average in 1940 was 0.14. In 1930 it was 0.18. In all probability the difference in 1920 was at least 0.18, resulting in an index of 1.75 for the lower quartile farm population of Minnesota in this year. New York was added to our calculations to make them more precise. New York was the largest contributor of the eastern states in the settlement history of the middle west in the early 19th century.

[9] We make this statement with caution because we have no accurate measure of differences in economic worth for the farm and non-farm populations.

In short, whereas a breakdown between the urban, the rural farm and rural families segrated meaningful socio-cultural groups in the earlier decades, this is no longer so true. The uniqueness of farming as an occupation, as a way of life, is disappearing. From other studies we know that the social and personal social behavior of farm families has undergone a rapid change in the past generation. Hence, some of the current descriptions of rural society, undoubtedly valid for an earlier epoch of American agriculture, have lost their accuracy.[10]

A computation of the true net reproduction rate is possible only for Wisconsin and only for 1940 rural. This was the only area for which data were available showing births by age of mother. The rate for the rural population of the state as a whole in 1940 was 1.23 and for the upper and lower quartiles it was 1.14 and 1.30 respectively. Comparing these rates with the index of net reproduction for the same population and for the same period, it will be noted that in each case the true rate is lower, but very close to the calculated index. This corroborates our earlier statement that the index should fall between the net and gross reproduction rates.

The foregoing discussion has all been in terms of female rates. Turning to the male replacement rate for Wisconsin (the method for its computation was described on page 462), we note some interesting developments. Although 1940 is now an historical date, we computed the rate for that year, which turned out to be 1.25. Translating this rate into actual figures, this meant that, allowing for deaths of males between the ages 20 to 60 years of age in the decade 1930–40, there were 3,052 more white males who entered into the cohort at the lower age of 20 than passed out through the upper age of 60 by age or death.

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[10] The following quotations are typical of the anachronisms found in almost all texts in rural sociology. "The narrower area of the interaction system of its members . . . predominance of personal and relatively durable relations . . . comparative simplicity and sincerity of relations." Pitrim Sorokin and Carle C. Zimmerman, *Principles of Rural-Urban Sociology*, Henry Holt & Co., New York, 1929, p. 57; "Rural farm populations . . . are void of most of the exciting stimuli to family irregularity which obtain in large places. . . . In no other part of the great society does the family retain and demand socio-economic integrity as among scattered farming people." John M. Gillette, *Rural Sociology*, Macmillan Co., New York, 1936, pp. 266–268; "The American mode of dwelling in scattered farmsteads has made of the family an unusually strong, effective, and self-sufficient economic and social unit. While forces have been at work completely severing the ties of family and occupation in practically every other vocation, they have largely passed by agriculture." Newell L. Sims, *Elements of Sociology*, Thomas Y. Crowell Co., New York, 1940, p. 507.

Following the same technique for 1950, but disregarding migration, the rate was calculated to be 0.86, or a reduction of 31.2 percent in ten years. This means an "excess" of 2,360 white males 20 years of age.

In the computation of the foregoing rate there is little room for error, because all of the events, except death, are already biologically set, it is only necessary to count them. The only artificial element is the assumed death rate, but the probabilities of its accuracy are too high to allow for much chance error. On the basis of the figures, therefore, it may seem that there is no doubt about Wisconsin farmers actually reproducing enough sons to assure a supply of successors to themselves. It is unfortunate that we cannot break down these data according to the upper and lower quartiles as in the remainder of this study, because there is sufficient evidence to support the belief that the "excess" comes mostly from the low economic quartile, and that some of the counties in the upper quartile are facing an actual deficit in 1950 if migration were to continue at the prevailing rates.

Not all farm boys remain on farms regardless of the ceonomic level of the home farm. If we assume that the rate of off-farm migration in the decade 1940–50 will be of the same magnitude as in the 1930–40 decade in all age intervals, then the 1950 male replacement ratio drops to 0.11.[11] In terms of men, this means that the difference in the number of young men who will be ready to take up farming, and the number who will pass off the stage through old age or death, will be only 315. Certainly this is not much insurance for the future and the future (1950) is less than four years hence. Furthermore, if we had the county data available, our guess is it would show that all of the counties in the high quartile group will have to look for migrating sons of farmers from the low quartile group to make up the deficit that their own low fertility is causing.

Conclusions

With all due consideration to the limitations in the present study, and the readers know by now that they are many, the down-

[11] In reality both the volume and rate of migration from the farms of the war years was the greatest in history. Whether it will remain high for the rest of the decade will depend upon urban employment opportunities. It would appear to us that the net loss of farm population will undoubtedly be greater this decade than last. Hence the estimate of migration may prove to be conservative and the "excess" of 315 may be more than erased.

ward trend of farm family fertility in our midst is unmistakable. It is following the pattern laid down with the industrialization and urbanization of western and northern Europe. The rate of change from a high to a low fertility is unrelenting, but here and there are points along the continuum that are more resistant to the erosiveness of sterility than others. These areas of concentration reflect the relative inelasticity of certain cultures. Some religious and nationality groups cling more tenaciously to the values inherent in their culture than others.

The varying rates of change which we have observed lead us to believe that when a people breaks loose from its deeply-seated cultural values, the contrasting culture types lose their unique group characteristics, and they are individually more susceptible to the less traditional but no less compelling social and personal ideas. Among Wisconsin farm families it is not so long ago that one of German or Norwegian nationality for instance, stood out from among the rest, and his social behavior could be related to a well-defined nationality pattern. The same has been true of the religious aspects of culture. Varying degrees of social contacts caused by differences in proximity to cities and in differences in the degree of concentration of the religious or nationality groups in question, and the desire to belong to and participate in status-giving organizations, the desire for modernization of the home and its conveniences, increased spatial mobility as reflected in the greater amount of leisure time and travel—all these are among the factors that have a definite influence on the growing practice of family limitation, regardless of the religious or nationality background.[12]

The index of net reproduction that we have computed does not mean that American agriculture is faced with an imminent decline of population. The index is based on certain logical assumptions. It "described the numerical relationship between the potentially

[12] For evidence on these points see: Walter L. Slocum, *Ethnic Stocks as Culture Types in Rural Wisconsin;* Harold T. Christensen, *Population Pressure Among Wisconsin Farmers;* Rockwell C. Smith, *Church Affiliations as Social Differentiator in Rural Wisconsin;* and Oscar F. Hoffman, *A Culture or Folk Study of Rural-Farm German Americans in Eastern Wisconsin,* doctoral dissertations filed in 1940, 1941 and (2) 1942, respectively. The most recent and by far, the most penetrating, study in which the greater fertility of Catholic families is established is currently being described in articles on "Social and Psychological Factors Affecting Fertility," by P. K. Whelpton and Clyde V. Kiser, *The Milbank Memorial Fund Quarterly,* Vol. XXI, July 1943; Vol. XXII, January 1944; Vol. XXIII, July and October 1945; and Vol. XXIV, January 1946. This study is based on an exhaustive analysis of the fertility records of 41,498 wives living in Indianapolis, Indiana.

fertile women in one generation and those of the next, assuming the maintenance of the given conditions of fertility and mortality."[13] If these assumptions hold true and if existing migration patterns are not severely changed, we know within limits the probable structure of our future population and it is this knowledge that we are after. We are not interested in estimating future population growth because an estimate is but "a description of the end results of the assumptions made" as the populationist, Dr. Charles has said.[14] Our position and purpose in making this general study is well stated by Landis, who, after discussing the limitations of long-time prediction of population growth on the part of the sociologist, says, "Although a socio-cultural approach removes any easy possibility of formulating universal generalizations or laws regarding behavior, *it does make possible a more realistic understanding of a population group.*[15]

A realistic understanding of population growth is basic to any rational economic and social planning in agriculture. Furthermore, a democracy demands a positive approach to population policy in agriculture planning it cannot be negative,[16] neither can it be revivalistic.[17]

To return to the economic aspects of our problem, it is clear that farm families who should be the most able to provide their children with social and economic advantages most of us agree as being desirable to a good upbringing, are the very ones who are having the fewest, if any, children. Most of the upper quartile counties of the states included in this analysis are located in the dairy area of Southern Wisconsin, Minnesota and Central New York where net farm incomes per family farm averaged close to $4,000 in 1945. The same quartile counties in the corn belt of Illinois and Iowa likewise averaged about $4,000 in net farm income for the same year.[18]

Notwithstanding our declining rate of growth, we in the United

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[13] Glass, *op. cit.*, p. 405.

[14] Enid Charles, "Differential Fertility in Canada," *Canadian Journal of Economics and Political Science*, Toronto, Vol. 9, No. 2, May 1943, p. 176.

[15] Paul H. Landis, *Population Problems*, American Book Co., New York, 1943, p. 46. (Italics ours.)

[16] A position sometimes taken by extreme geneticists and eugenicists, e.g., Guy Irving Burch, *et al.*, *Population Roads to Peace or War*, Population Reference Bureau, Washington, D. C., 1945.

[17] Cf. O. E. Baker, "The Effect of Recent Public Policies on the Future Population Prospect," *Rural Sociology*, Vol. 2, June 1937, pp. 123–141.

[18] *Typical Family Operated Farms, 1930–45*, Bureau of Agricultural Economics, United States Department of Agriculture, April 1946.

States are not yet faced with the need of finding means of stimulating the growth of our population.[19] Many countries have tried, but all unsuccessfully to revitalize a population having a low fertility. Governments have found that people cannot be bribed nor bludgeoned into having children when they do not want them. People in a democracy sanction and support positive social action. It follows therefore that judicious policy should be to concentrate on raising the standards of living of the segment of our agricultural population which is bearing the children who will be the farmers of tomorrow. In this sense we would sharpen the recommendations of the report, *Post Agricultural Policy*,[20] and go even farther than Professor Schultz does in his comments on this report.[21]

Pushing the thesis of both of the foregoing reports farther, we maintain that the farmers in the higher economic quartiles have a genuine stake in the welfare of those in the lower quartiles. Greater effort needs to be made to the end that the farm boy who will be reared by the lower quartile family, but who will be forced to migrate and eventually assume the management of the economically larger farm, will have the physical, the mental, and the social equipment to enable him to keep up the managerial standards of the larger farm. Likewise, some of the farm girls from the most fertile lower quartile will be required as wives for the dimishing number of young men in the upper quartiles, and they, too, should therefore have the training and bio-social resources which only a higher standard of living than that which they now have can give them.

Primogeniture as a technique of handing down farms is made

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[19] The net reproduction rate of the United States has risen from 1.024 in 1940 to 1.138 by 1945, because of the war-inspired increase in the birth rate, but there is no reason to suspect that this upward trend is anything more than a temporary phenomenon and that the long-time reproduction trend is downward. "A false optimism may prevail regarding the size of our future population as a result of the fact that the observed rate of natural increase in the past four years has been in excess of 1 percent per annum. It should be emphasized that this measure is a misleading index of the course of population growth. Our present population has a high proportion of women in the reproductive ages, a situation which is necessarily only temporary, and in time will pass. When allowance is made for this fact—by taking into account mortality rates and reproduction rates specific for age—we have the 'true' rate of natural increase, which is generally much below the observed rate." Metropolitan Life Insurance Company, *Statistical Bulletin*, Vol. 27, No. 4, April 1946.

[20] *Postwar Agricultural Policy*, Report of the Committee on Postwar Agricultural Policy of the Association of Land Grant Colleges and Universities, October, 1944.

[21] Theodore W. Schultz, *Agriculture in an Unstable Economy*, McGraw-Hill Book Company, New York, 1945, pp. 207–208. This is one field in which there is room for action "within" agriculture, to follow the division employed by Schultz.

easier and becomes more in order with each succeeding year of lowered population growth and smaller families. The practice offers social and economic advantages that the economically successful farmer would do well to consider more seriously than he has, if he is to keep his only son on the farm.[22]

The increasing mechanization of American agriculture, at first thought, may be more than offsetting the influence of declining population fertility on the agricultural labor force. It is inevitable that "technical progress means that fewer workers are required in agriculture," and successful, modern farming requires less brawn and more brains that the farming of a generation ago."[23]

Not all of the new farming methods will displace labor. Some may even require more labor; most of them will surely demand a higher type of labor than the marginal (marginal in terms of ability and in the duration of the seasonal employment) worker employed in the cultivation and harvest of cotton, tobacco, peanuts, sugar cane, and sugar beets. These are some of the crops that are imminently facing increased mechanization, and with only one exception they are concentrated in the areas of greatest rural population density.

Increased mechanization, therefore, will release labor in the largest numbers from the three southern census geographic divisions where the gross production per agricultural worker is consistently less than half that of workers in other regions and where about half of all farm workers in the Nation reside.[24] Stating the implications in another form, in areas such as the deep South principally will mechanization and replacement of labor offset the lowering of the size of the labor force caused by the declining fertility of farm families.

How many of the farm operators and laborers from this group will be available as laborers on other farms after their displacement,

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[22] See Kenneth H. Parsons and Eliot O. Waples, *Keeping the Farm in the Family*, Research Bulletin 157, Agricultural Experiment Station, University of Wisconsin, September, 1945, for an analysis of the processes of farm ownership in a restricted low tenancy area of Wisconsin.

[23] Sherman E. Johnson, *Changes in Farming in War and Peace*, United States Department of Agriculture, Washington, D. C., June 1946, pp. 57 and 61. Dr. Johnson's description of the post-war power farm envisages revolutionary management practices in the farm plant that are bound to have repercussions on the farm family, the institutions of rural society, and even upon the general economy of the nation. The problems of conflict that will arise in the period of accommodation should challenge the interest of every social scientist in agriculture.

[24] *Ibid.*, pp. 59–60.

is open to conjecture.[25] Certainly, many of them will turn to other industries, some of them may also form the vanguard of emigrating rural Americans seeking security in other lands, in Canada and in South America. If the post-war plans of some of the South American republics are even partially completed politically, large areas of land will be thrown open for settlement on more attractive financial and social terms than were available to many European peasants whose offspring now help to make up our American farm population.

The chronic nature of the agricultural labor shortage in other than the three foregoing divisions of the country, in areas that are now highly mechanized, is some evidence of the disappearance of the "surplus" of rural population about which so much has been written. A proportion of the former agricultural workers who were among the 5,000,000 farm people who moved out of agriculture in the years 1940-44, will return and will be available again for farm employment. Likewise, many of the millions who left the towns and villages of the rural areas will return and will again help swell the seasonal agricultural employment force. The aggregate, however, is diminishing and each succeeding year finds the farm employer paying more to attract the available labor; paying more not necessarily in wages alone, but also in better housing, more favorable working conditions, shorter hours, medical care, recreational facilities, and improved employer-employee relations.[26]

The long time trend in the decreasing number of farms and the increasing size of farms through farm consolidation, is another result of the processes of mechanization. But here again there will be no unilateral, national pattern. Certain areas only of our nation will feel this change to any marked degree. The greatest impact will be felt in the southern region previously referred to, and in other marginal soil areas of the Nation where small farms are the rule. Likewise the long time trend may be reversed for a time because of the return of war veterans and industrial workers to the abandoned or temporarily closed farms in these areas, if the current resettlement

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[25] Group II of the four classifications adopted by the House Special Committee on Postwar Economic Policy and Planning, House Report No. 2728, 79th Congress, 2d Session.

[26] The Bureau of Agricultural Economics reports that as of July 1, 1946, 1,045,000 veterans of World War II were employed on farms, and that this number represents slightly more than three-fourths of the number of farm workers who enlisted or were inducted in the armed forces up to July 1, 1945.

activity in the cut-over portion of Wisconsin is typical of other similar areas.[27]

Finally, mechanization will have a still differing influence on the farmers of the higher economic quartiles in the area of the present study. Unless the forces of a depression cause him to do otherwise, we believe the commercial farmer will

"retain some of the real benefits from agricultural improvement by slackening the pace of farm work and increasing the leisure time available for the farm family, and invest increased earnings in education and health, and in home conveniences."[28]

Furthermore, the daylight to dark fourteen to sixteen-hour day, which even now is but a myth on most of our farms, will come in for considerable shortening. Just as industry is adjusting to a forty-hour week, and thinking in terms of thirty, so farming faces the adjustment to a reasonable work week. We, therefore, should expect the lightening of labor tasks for both hired help and the operator rather than any large scale and immediate substitution of machine power for hand labor in most of our heavy farm producing regions, unless our total national economy is willing to undergo a greater revolution than can now be considered rationally feasible.[29]

Those of us who are responsible for agricultural education must face squarely the implications of a forward-looking population policy. It is not enough that we point out the adjustments that lie ahead for the farmer. It is for us to make sure that the classrooms and the laboratories of our land grant colleges are as accessible to the boys and the girls of farm families in the lower quartiles as they

[27] Walter Wilcox has just sounded a warning note against the prevailing opinion in favor of farm consolidation. "When the problem of the small farm is approached from the standpoint of the people rather than the efficient use of man labor and machinery, one finds that these small units are performing a real service to Wisconsin people. The availability of these small acreages equipped with sets of farm buildings give families which prefer the independence and the freedom from worry associated with a small farming enterprise an alternative which they would not have otherwise. Education and other governmental action might better be directed toward increasing the capacity and efficiency of present and prospective small farm operators rather than facilitating the consolidation of small farms. These units permit many families to enjoy a modest standard of living under conditions which suit them better than elsewhere in society. It is questionable whether or not families having these desires and abilities are decreasing as rapidly as are the small farm units." Walter W. Wilcox, "The Economy of Small Farms in Wisconsin," this JOURNAL, Vol. XXVII, No. 2, May 1946, pp. 473–474.

[28] Sherman E. Johnson, *op. cit.*, p. 63.

[29] The agricultural labor force on August 1, 1946 was 11,044,000 compared to a August average in 1935–39 of 11,515,000. Of these totals, 2,786,000 and 2,983,000 were hired non-family workers in the respective periods. *Farm Labor*, Bureau of Agricultural Economics, United States Department of Agriculture, August 12, 1946.

are to those in the upper. Likewise, we also need to be as faithful in disseminating the facts of farm science through our agricultural extension facilities among the farmers in the low-income areas as we are among those in the high-income areas.

Unless the monographs on farm management, social and economic organization, which we have had opportunity to study since returning to academic work in this country have been atypical, social scientists continue to find it difficult to define problems for study outside the line fences of our blue ribbon farms. Few of them concern themselves with the farm plants and with the families of those who constitute the real seedbed of our farm population. Yet, to fashion an agricultural policy that will be both realistic and that can be made applicable to all of agriculture, we need to have the facts on the farms from whence come our human surpluses as well as on those from whence come our crop and livestock surpluses.

To conclude this long discussion, let us not forget that agriculture as an industry is in an advanced stage of development in our Nation because of the receptivity of farmers in general to new scientific farming ideas. At the same time let us bear in mind that the trend in farm family fertility is stark evidence that farm people are just as ready and willing to accept new *social* ideas, ideas which are becoming a part of their emerging culture and which are influencing their biological behavior. Good judgment, therefore, dictates that the social scientist keep abreast of the rapidly changing idea system of farm people and the resulting new behavior norms.

There is no turning back because the direction of cultural change is forward. We therefore hold no stock with those whose goal is backward and who decry the trend of a declining population because it necessarily leads to a decadent way of life.

Ours is the challenge to stimulate the social mobility of farm people, to give them as wide a horizon of contacts as is true of urban life. Ours is the task of widening the farm-to-market road so that the flow of ideas and people will become a normal two-way process. Only in this manner can we rid farm life of its long-standing disadvantages in education, health, communication, recreation and the other necessary components of full living. And, as a result, agriculture will stand up equally with other vocations for consideration when the young man, whether he be city or farm-reared, chooses and prepares for his life's work.

EVALUATING SOIL CONSERVATION

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THE Federal government has appropriated more than $1,871,576,000[1] in behalf of soil conservation during the past ten years. Most of this amount has been expended for programs designed to retard erosion and depletion, and to rehabilitate the productivity of privately owned farm lands. This emphasizes the great interest that society, or the public, has in the future productivity of the soil. It also emphasizes the question, What is the benefit-return on this large investment?

It is practically impossible to measure precisely the social benefits of numerous conservation measures because of their intangible character, and the uncertain futurity of their occurrence. But in terms of farm operation and management it is important that privately financed measures return a net benefit, and that public investments are made to the greatest advantage from the standpoint of social welfare. Legislators need guides relative to the wisdom of voting appropriations; administrators need valid justification for their activities; creditors need loan justifications; and farmers and taxpayers want to know whether the recommended measures "pay" or not.

With these demands in mind, it is the aim here to take a look at what has been done in the way of evaluating soil conservation, to review other proposed methods of evaluation, and to suggest an alternative approach to the problem of evaluating the production benefits that may accrue as a result of the employment of specific conservation practices and improvements on farm land. Such social benefits as may indirectly accrue are omitted from consideration at this time.

In order to be understood in a practical sense, purely theoretical and academic concepts are avoided. The philosophy and objectives of conservation, as they are more or less generally known, are as-

* The helpful criticism of this article by several associates is gratefully acknowledged, but the author alone is responsible for the opinions and conclusions presented.

[1] Includes total appropriations to the Soil Conservation Service, and that portion of the funds expended by the Agricultural Adjustment Administration and its successors for the purpose of conservation, from 1937 to 1946, inclusive; but excludes "adjustment and conservation" payments, in the amount of $2,441,698,000, made by the latter agency during the same period.

sumed to be valid. But it is not presumed that all recommended measures and practices are necessarily *economically effective*. This gives rise to the need for evaluating procedures. This appraisal of methodology and procedures is designed to point the way toward improvements in evaluations of this character.

Measuring Soil Conservation

In order to determine the economic effectiveness of measures and practices designed to achieve soil conservation, it is first necessary to identify and describe the attributes or benefits that are to be evaluated or compared with costs. Heretofore confusion in this regard has led analysts to propose that conservation is good farm management. It is true that successful conservation depends on good farm management, and must conform thereto. However, in order to measure the effects of conservation it is first necessary to decide what constitutes conservation *per se*, apart from the overall character of farm management. Those particular practices which are to be considered soil conservation must be specified, so that their results may be identified and measured.

For this purpose, it is suggested that the following practices and installations be tentatively considered as being the primary components of soil conservation:

strip-cropping
sod-waterways
vegetative plantings
cover crops
gully control dams
diversion ditches
terraces
stream bank structures
contour furrows
forest fire controls
mulching

Another group of practices may be soil conservation, depending on whether their primary purpose in to enhance immediate productivity or to accomplish a reduction in soil and water losses over a period of time. In fact they may have dual or joint aims. These include:

type of farming adjustments
landuse adjustments
pasture rotation
crop rotation
green-manure crops
stock water ponds
fertilization
liming
legume planting
tree planting
stream straightening
farm fencing

Still another group of practices have commonly been associated with soil conservation programs. In some instances they may be complementary, but in general they cannot be classed as contributing directly to soil conservation. This group includes:

wild-life programs	drainage
improved varieties	improved farm management
pasture mowing	forest management

The direct results of those practices which contribute to soil and water conservation may be termed the "conservation attributes" (gains or losses), which it is desirable to measure as a basis for evaluating the costs and benefits involved. Presumably these attributes will be:[2]

(a) reductions in soil losses
(b) reductions in plant nutrient leaching
(c) reductions in soil water losses

To the extent that the practices enumerated in the three groups above, either singularly or in combination, produce these attributes they may be classed as soil conservation practices.[3] If they do not influence soil, nutrient, and water losses there is no basis for including them as conservation. Any complementary or supplementary measures must be appraised in their own right, according to the results produced.

The above attributes may be measured in two ways. First, they may be measured in terms of tons of soil, chemical content, and moisture content. Then it is necessary to convert them to crop and livestock yields, either hypothetically or by actual field practice, according to the "time-pattern" which will characterize their occurrence. The time-pattern of occurrence is important because it may determine the practicability of the specific measure under certain circumstances, and whether the attribute will accrue to private or social interests. Thus, a basis for allocating costs to private property owners and to public interests may be developed.

It is probable that the benefits of conservation will accrue as a

[2] Recent work may prove that the maintenance of "soil structure," in some locations, should be an important aim of conservation, in behalf of future productivity. Organic content and other factors may influence soil structure materially.

[3] The common objection to the evaluation of any practice or combination of practices independent of the "complete conservation farm plan for the entire farm unit" leads one to inquire what the complete plan is. It must be a combination of practices, but let it be ascertained that all are capable of producing significant soil and water conservation benefits. This is the crux of the evaluation problem.

variable "flow". The pattern of accrual may be determined by the time required to achieve the full effect of any particular combination of practices; and the variation in climatic conditions which may or may not give rise to a benefit from certain practices. After sufficient testing it may be possible to develop average annual benefits that may reasonably be expected from any single practice, or from two or more practices in combination. It is important, however, that the occurrence of benefits as a variable "flow" be recognized in order that measurement techniques may be fashioned accordingly. Otherwise, attempts to measure conservation benefits may not be valid.

Exceptions or variations in procedure may be necessary in the case of benefits accruing in the form of reductions in sedimentation on roads, increases in the flow of springs, and reduced reservoir siltation. These may be measured as labor units necessary for removal, gallons of water, and reduced replacement costs, respectively. Money values may then be applied directly.

These examples illustrate the wide variation in types of benefits that may be claimed for conservation programs. Some may be direct or indirect, tangible or intangible. To cover all these ramifications is more than can be done in a brief article. Consequently, it is desirable to limit this discussion to those attributes of soil conservation which are expected to accrue to farmers, and that may be measured in terms of crop yields, livestock production, and in turn, farm incomes.

Methods Employed

The major attempt to measure the economic value of soil conservation *per se* was made by the Economic Research Division, Soil Conservation Service, in cooperation with the Bureau of Agricultural Economics and about seventeen State Agricultural Experiment Stations. The objective, as stated in project agreements, was to "measure the effects of a definitely planned program of soil and water conservation." The general course that was followed might be termed the "historical", or the "before and after" method.

Historical Method

The procedure was to obtain records of farm practices, production, and income from farmers, by survey schedules or cost-account

records, before the adoption of soil conservation practices and then to obtain like records on an annual or periodic basis afterward. By this procedure it was intended that the effects of the programs could be measured in terms of changed practices and farm or labor income. A variation of this procedure also was employed widely. Farms for which planned conservation programs were contracted on a 5-year basis (cooperators) were compared with farms having no contracts (non-cooperators), in the project demonstration areas.

The weaknesses in these methods are quickly evident. Collier has pointed them out.[4] They are reviewed here briefly in order to facilitate comparisons, and as a basis for completing the list. *First*, variations in climate, prices, costs, marketing conditions, and other similar factors seriously distort any series of yield or income comparisons, on which the historical procedure depends. These effects are likely to be greater than any effects of conservation. This has been proved to be the case, even over periods of five and ten years. In other words, the effects of conservation cannot be isolated from the effects of other non-related factors. *Second*, changes in management, production intensity, size of operating units, and types of farming cause similar variations in yields and income which cause income fluctuations that cover up any possible effects of conservation. *Third*, the comparisons of "cooperators" and "non-cooperators" in any specific year or over time brings into the picture even greater difficulties, in the form of fundamental differences in the character of the two groups of farms, wide variations in levels of management, the kinds of practices employed, and variations in the initial need for conservation. These factors are extremely important when the objective is to determine the extent to which the applied program may be reaching the most acute problem farms. Cooperators may be a group distinct in many ways when compared to non-cooperators.[5]

The favorable features of the "before and after" approach are (a) the value of following an identical physical unit; (b) the possibility of following a variable flow of benefits through a period of years; (c) the possibility of observing the impact of a specific program in terms of its relation to the overall management program,

[4] George W. Collier, "Procedures for Studying the Returns from Conservation Farming," this JOURNAL, August 1945, pp. 686–688.

[5] E. C. Weitzell, "Economics of Soil Conservation in West Virginia," West Virginia Agric. Exp't. Sta. Bul. 305, p. 31.

and the farmers' general reaction to it. This third point has been upheld as an important aspect of the application of conservation practices, and was the basis for early decisions that conservation might be measured through farm income, as the final product of the combined influences. There is reason to believe, however, that this is not of substantial importance if the practice *per se* is profitable either in the present or in the foreseeable future. Except for certain changes in working habits, and the essentiality of certain technical knowledge and skills, the application of any specific conservation practice is little different from the introduction of hybrid seed corn or similar innovations. In any event, each specific practice or segment of a program must be separately profitable before acceptance and application is feasible.

Other than economic significance, the additional factors that might be important are seasonality of application, time required, feasibility of landuse adjustments in terms of land available and type of farming, and the pressure of time preference. In general, these are considerations to be ironed out in farm planning. They may or may not be important. For example, Tom, reporting from New York,[6] cites evidence that the extra time required for strip-cropping is not significant in terms of causing inefficiency. Research in West Virginia[7] indicates that a lack of ability to make land-use adjustments in favor of conservation, and time preference for consumption income, are two extremely important factors in achieving the application of conservation farming. This type of consideration we repeat, is a matter of farm planning and is not included in the present study of methodology, except as it might affect the cost-benefit character of a specific conservation practice which is to be evaluated.

Budget Method

Sometime after the above described procedures had been carried along as operating projects in several locations, the leaders of the work began to recognize some of the weaknesses involved. Moreover, other interests began to exert pressure to obtain more immediate proof that conservation programs were highly advantageous to farmers. As a result the "budget" method was advanced. Pro-

[6] C. A. Tom, *Time Requirements and Costs of Farm Operation on Strip-Cropped and Non-Strip-Cropped Fields*, New York State College of Agriculture, A.E. 329, 1940.

[7] E. C. Weitzell, *op. cit.*, pp. 55–56.

ponents of the change insisted that this method eliminated many of the criticisms of the historical method, and immediate results could be determined. In addition, there was a definite trend of thinking away from measuring the economic effects toward "advance estimates" as aids to planning farms for conservation.[8]

The procedure was: *First* to obtain farm or labor income schedules, including any additional land-use and practice data deemed essential for the farms to be conserved; *Second*, to obtain the proposed programs of conservation for the same farms; *Third*, the changes made necessary by the program would be made in the existing land-use and practice picture; and *finally*, a financial budget would be developed showing the projected effects of the conservation program on farm income.

The major handicap of this method was that sufficient information was not at hand for carrying through the final step.[9] No one knew what the results would be under the various circumstances encountered when budgeting farms in different locations, of different physical characteristics, and of different types. In fact, insufficient information was available for even a limited use of budgets. To a large extent, the same is true today.

Other criticisms of this procedure are: (a) Considerable degrees of judgment are involved and this frequently causes bias in results. (b) Experience indicates a tendency to exaggerate the results of conservation, which comes about by reason of the effort to follow them through the maze of other variables which normally may obscure even significant effects. (c) There is always the tendency to follow standards or ideals, rather than actual practices. (d) The process is laborious if a high degree of essential detail is involved. And (e) the budget method retains the practical impossibility of measuring minor economic effects through the medium of comprehensive income statements.

From the standpoint of sampling, the original schedules may be obtained from representative farms, following any one of a variety of sampling procedures, depending on the availability of projected or recommended conservation programs for the same farm. In this respect the historical and budget methods are similarly acceptable.

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[8] Neil W. Johnson, *Analysis of the Present Program of Research in the Economics of Soil Conservation, and Suggestions for Its Improvement*, Bur. of Agri. Economics, U. S. Dept. of Agriculture, Mar. 1943, pp. 14–15.

[9] *Ibid.*, pp. 15–16.

Thus, it might be possible to select samples representing larger universes which would enable the extension of sample results to the universe under study. The short time required to budget resulting benefits, providing that basic data are available, is the major advantage of the budget compared with the historical method. In fact, the budget method offers the only feasible method of projecting conservation and other farm plans into the future. In general, however, the budget method has the fault of permitting bias judgments and artificial generalizations. On the other hand, farm budgets are a good planning tool, and if the essential basic data are made available in reliable form there is reason to believe that this procedure has fewer faults than the historical method or the following merit point approach.

Merit Point Method

In a recent issue of this *Journal*,[10] Collier presents a "Procedure For Studying Returns From Conservation Farming" which we shall call the *merit point* method for the sake of convenience. This proposal involves the comparison of "conservation" and "non-conservation" farms in the same year. The following description and examination of this proposal is based on the article cited. The brevity of the article at several points makes it necessary to presume certain necessary connecting steps between stated procedures and indicated aims.

Briefly, the merit point method attempts to relate varying degrees of applied conservation to variations in income. It is assumed that income will bear a direct relationship to the extent to which conservation practices have been applied. Thus, the differences in income between "conservation" and "non-conservation" farms will measure the benefits from conservation.

Although the article does not provide the details of procedure, the following steps would necessarily be involved: (a) the selection of a representative sample of farms from a specified universe; (b) the procurement of detailed data for each farm, including physical, economic, and managerial characteristics, and detailed descriptions of conservation practices as they exist; (c) sorting the sample "a" on the basis of the above characteristics and descriptions "b" in order to obtain comparable groups of farms to be compared; (d) the

[10] George W. Collier, *op. cit.*, pp. 688–694.

development of a practice "rating" for each conservation practice under varying conditions, weighted according to the importance of the respective practices; (e) calculation of a merit point score for each farm in the sample, indicating the extent to which needed conservation practices have been applied; (f) arraying of comparable farms on the basis of income and merit point scores; and (g) the computation of income differences according to variations in the merit scores of farms within each homogeneous group. The sum of the income differences presumably would represent the value of conservation for the sample.

The selection of a representative sample of farms entails the usual problems. If a true picture is to be had as a basis for objective results, all types and sizes of farms and land conditions must be represneted in the proportions that actually exist. The sample must not be confined to any modal group, to typical farms, or to predominating land capability classes. Of course, separate or limited analyses may be made for any selected part of the universe.

The procurement of physical, economic, managerial, and other descriptive data entails the common problems of collecting farm statistics. Cooperation of farmers is necessary, and the errors of memory are always an incalcuable quantity. As a basis for rating the application of practices, it is suggested that data covering "the most important land treatment factors . . . " would be obtained " . . . for a five year period prior to the year . . . " in which results were to be measured.[11] This requires a dependence on memory, in the absence of suitable records. The use of judgment enters into the determination of the significance of what has been responsible for the existing state of conservation or the lack thereof. This is extremely important in order to be certain that the specific conservation practices being considered, or the failure to employ them, was responsible for existing resource conditions. Otherwise, the results may be the measurement of the effects of entirely different factors.

The sorting of any sample of farms into comparable, homogeneous groups is a difficult job. The sample must be large enough to permit the assignment of a reasonable degree of significance to each comparable group. The wide variation in the character of farms in an area is general knowledge; and a glance at the following partial list of variables indicates the possibility for an almost endless num-

[11] Collier, *op. cit.*, p. 691.

ber of groups, depending on the degree of likeness that is necessary or desirable. This list of variables includes only the captions of the major sorts. Subdivisions are omitted in behalf of brevity.

1. Land-use capability or productivity rating
   (a) Classes 1–5 (at least)
2. Size of farm
   (a) Acreage of cropland
   (b) Acreage of pasture
   (c) Acreage of woodland
3. Type of farm
   (a) Number of types depending on area
4. Intensity of production program
   (a) Wide variations in intensity
5. Technology
   (a) Degree of mechanization
   (b) Quality of varieties and strains
   (c) Quality of breeds
   (d) Management
   (e) Fertility practices
6. Extent of conservation (merit point score)
   (a) High and low (at least)
7. Length of time measures installed
   (a) No benefit period
   (b) Degree of benefit
   (c) Full benefit
8. Weather conditions during the growing season
   (a) For any given area, even for adjoining farms, weather conditions may influence production considerably for any single year.

If the sampling process is to be acceptable, it will be difficult, if not impossible, to select initially in order to eliminate any of the above factors. It is evident that several hundreds or thousands of farms may be necessary to obtain representative groups of comparable farms large enough to be significant. Moreover, the job of handling such a sorting job would be difficult. It is obvious that multiple correllation analysis is not applicable for such a large number of variables. Hence, the analyses must depend on mechanical or handsorting procedures. For the areas of the country having diverse farming and metes and bounds surveys this procedure would be practically impossible, unless a large number of the variables were ignored. For rectangularly surveyed prairie or plains farms of uniform use capability or productivity the grouping of comparable farms would be more nearly feasible.

The development of conservation practice merit ratings or

weights for each resource area is a matter of judgment as to what constitutes conservation for the particular area. There are usually alternative ways of accomplishing erosion control and the maintenance of productivity. For example, fertility practices may be substituted for mechanical measures, or changes in landuse may allay the need for other measures. Certainly, in order that uniform concepts are the basis for each respective set of weights, they should be developed by the same persons, or at least be reviewed by an "equalization" board to iron out disparities.

The calculation of merit point scores for each farm in a large sample is a laborious job to say the least. More than this, the degree to which a farmer has accomplished conservation is a matter of judgment to a large extent, unless major dependence is placed in the extent to which certain measures have been applied or installed. Strict adherence to the latter would be superficial since it is the result, not the practice, that is to be measured. In this respect, Collier suggests the review of significant practices for a five year period[12] in order to arrive at a qualified rating. He also suggested that the basis for merit score ratings might be limited to key practices.[13]

In arraying the farms within each comparable group according to merit point scores and income (either gross or net) it is suggested that high and low score groups be segregated on the basis of a more or less arbitrary definition of a conservation farm, in terms of point score, depending on the frequency distribution of scores or ratings.[14] This is not acceptable *per se*. The definition must be based on justifiable standards of conservation accomplishment. Otherwise, if all farms in the group fell within a score-range of 10, for example at any point in the possible range, some separation might be attempted which would carry little or no significance.

From this point the proposed procedure is unexplained. Several implications will enable us to carry the examination on, however. The possibility for variation in procedure is not great, in any event. The reader will find it necessary to follow the remaining appraisal of this method closely because some of the points are somewhat involved.

Apparently, it is assumed that the array of comparable farms will show a direct relationship between high merit point scores and

[12] Collier, *op. cit.*, p. 691.
[13] *Ibid.*, p. 693.
[14] *Ibid.*, p. 691.

high incomes. This correlation is essential to the objective of benefit measurement by this procedure.[15] On the contrary, there are important instances where this relationship would not hold. For example, (1) if conservation leads to less intensive land utilization (i.e., crops to grazing or forestry) the correlation between income and merit scores might be inverse, rather than direct. And this is a common part of farm plans for conservation, and often an important one. (2) In any instance where income must be foregone in the present, in favor of conserving or rehabilitating farm lands, the relationship between merit point score and income may be inverse. Consequently, this procedure depends on a positive change in current income as a result of conservation. Otherwise, it is not applicable.

The computation of income differences—as the benefits from conservation—involves still more serious limitations. *First*, it is improbable that the benefits, which may reasonably be expected from conservation, will represent a portion of net or gross farm income large enough to be significantly measured as an increase (or decrease) in the total. Even if it were possible to select comparable farms, with and without conservation, it is doubtful that the logically small proportion of total income could be so identified, except in extreme and unusual instances. *Second*, assuming the above to be possible, it should be recognized that the benefit accruing in any one year is not the total benefit from conservation; in fact, not necessarily the average annual benefit. It is impossible to determine the relative state of depletion and conservation which characterizes the farms being compared. Visualize a declining line of depletion and a corresponding inclining or level line of conservation; the value of conservation corresponds to the triangular area between the two. Thus, the total value (capital) is the capitalized value of the average annual benefit, beginning with any specific year. In order to make this capitalization correctly, or to compute an average annual value, the relative progress of the farms being compared along the two courses must be known.[16] Third, this procedure

[15] In addition to a number of more or less valid claims for this method, the author states that it will "help to answer the frequent query 'What will it do to my income?' " It is from this standpoint that this method is being examined. This is in keeping with Collier's criticism of the *historical* approach as he finds a need for and introduces the "merit score" proposal. (*Ibid.*, p. 693.)

[16] In addition to discounted future annual earnings for a given number of years, the value of conservation should include the value of the capital resource, which is maintained at the end of the assumed income period. Otherwise, the primary aim of conservation may be ignored. For society the status of the basic resource at any

offers no possibility for testing the value of specific practices and installations, a number of which may be included in a conservation program. It is essential to know the relative value of each component, as well as that of a combination of practices, if a usable evaluation is to be possible. *Finally,* measurement of differences between various levels of conservation is only a partial measure. Unless non-conservation farms have *no* conservation (zero merit score) the full value of benefits could not be measured by this method, all other objections notwithstanding. In fact, exploitative farms may have zero conservation but be realizing a reasonably high annual income as a result of capital (land) liquidation.

The foregoing appraisal of the Merit Point Method may be summarized as follows: (1) It retains the fault of the historical method by endeavoring to isolate and measure the relatively small benefits that may reasonably be expected to accrue as a result of conservation in terms of farm income. (2) The selection of statistically representative sample groups of "conservation" and "non-conservation" farms that are comparable is extremely difficult. (3) It is entirely possible that the budget method of handling costs and benefits may be combined with the merit point score card idea to make a usable educational device. This would retain the close relationship between farm management factors and conservation that is necessary and desirable. It also would provide equal emphasis on costs and benefits. The significance of costs may otherwise be lost in the shuffle. (4) There is no necessary correlation between the amount of conservation and current farm income; and the measure of the differences in income between levels of conservation would be only a partial measure at best.[17] (5) It is certain that the merit point method offers no workable procedure by which the farm benefits from conservation can be estimated for areas, regions, or the Nation.

Experimental Method

Unfortunately, evaluations of the type discussed here usually are not undertaken until some urgent need arises. Immediately, time

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given time in the future may be more important than the income between now and then. Of course, if any infinite flow of income is capitalized, the full value is represented by the capitalized value.

[17] If direct correlation between merit point score and income could be assumed, it is conceivable that a rate of increase in income based on the intensity of applied conservation could be derived.

limitations place handicaps in the way of many methods. In the case of public expenditures for the improvement, protection, and conservation of natural resources, evaluation (both economic and physical) should be continuous. Prior research should be the basis for initial recommendations, and succeeding examinations and evaluations should guide the programs as they are applied.

Early in this examination the occurrence of conservation benefits as a "variable" flow was noted. Subsequent discussions of methodology pointed out relative possibilities of recording and measuring this pattern of occurrence. Although the historical farm income method has the possibility of following this pattern, it is likely that identification and measurement will be handicapped by the simultaneous effects of numerous unrelated and uncontrolled factors. The budget method might recognize this fact if the basic data were accurately obtained. But the merit point method, at best, would record only cross sections of income or production streams; and there is no provision for determining the stage of the flow. It must be recognized that any method suitable for measuring benefit streams must be historical in the sense that the variable occurrence of benefits over time is satisfactorily recorded.

Following the foregoing criticism of the orthodox historical method, it may be well to emphasize the fact that the flow of benefits accruing as attributes of conservation may be *measured as physical quantities*. In fact, they *must* be, in order to avoid the complexity of income (monetary) variables which have no relation to conservation *per se*. This is the primary reason for advancing the proposal which follows shortly. It should be clear that economic interpretations of physical attributes may be added as a part of the appraisal process. This procedure permits complete control of this troublesome group of variables.

On the other hand, it is unlikely that any single technique will be found for evaluating soil conservation which will be completely satisfactory. The very nature of the occurrence of benefits, and the difficulties of isolating them from other effects, prevent the application of any perfect approach. This is true of all resource benefits that have joint characteristics and relationships. Directness of occurrence, tangibility of character, and the definity of incidence determine the ease or difficulty of measurement. However, the aim must be to find a method, or a combination of methods, that conform to acceptable standards of scientific investigation, and which

provide a usable result. In this instance, "a usable result" is a measure of the benefit to be derived by farmers from the application of specific conservation practices, in terms of the cost of these practices. It is desirable to know this, not for a single farm only, but for large groups of farms. The following suggestions are made in behalf of a workable procedure which will provide a usable estimate of this character.

The method proposed here is not new. On the contrary, it is one of the oldest techniques known to agricultural science.[18] Crops, livestock, fertilizers and other items have been tested experimentally for many years. One can scarcely see any great difference between testing or evaluating a new strain of hybrid corn and doing the same for a conservation practice. In fact, the physical scientists, have been making these tests for decades. The trouble is that the economists have not made use of the data, or they have not found the physical-test results to be presented in a form to which economic analyses are applicable. Perhaps the fault has been of both sorts.

The following description of the proposed experimental procedure is tentative. (1) Define the practices and combinations of practices that may be considered as constituting conservation from the various land-use capability or productivity classes of soils in the different resource areas or provinces. (2) Systematically, and as rapidly as possible, establish test plot and field evaluations of those practices and combinations of practices that may be considered as constituting conservation under varying resource conditions, giving due consideration to all factors that may induce differences in the results of specific measures or programs. It is unnecessary to explain the details of experimental tests of this kind, except to point out the need for strict adherence to the essential controls, representativeness, and comparability; and the necessity for designing the controlled physical tests in a fashion that will facilitate economic interpretation of the results. The plot and field tests must be planned carefully to fit the prevailing systems of farming. In other words, the practical application of the results must be the guide for designing the evaluation of conservation practices, in an effort to reproduce actual farming conditions as nearly as possible. This requirement prompts the suggestion that field experiments, conduct-

[18] This is essentially the method presented by Neil W. Johnson, *op. cit.*, pp. 16–17, under the title of *Controlled Experiments*.

ed on privately owned farms under actual farm conditions, will be most suitable. In fact, this will be essential if substantial progress is to be made. Agreements with farmers, involving the necessary controls and responsibilities, will be necessary. Encouragement to agree to the use of land for tests of this character might be in the form of such contributions as the experiments provided, cash rental for fields involved, compensation to farmers for work performed, and reimbursement for damages where necessary. Additional tests could be established on publicly owned lands, particularly at the Soil Conservation Experiment Stations and the State Agricultural Experiment Stations. The evaluation work of the experiment stations, during the past ten years, undoubtedly represents considerable progress already. (3) Records of all inputs, installations, and practices will be required, along with the costs and time involved. Annual progress reports, showing the physical results together with their economic interpretations, should be made. (4) When adequate reliable experimental evidence has been gathered for any land class or soil group, reasonably reliable estimates of the value of conservation may be obtained by an extension of the results to the area involved. Estimates of benefits may be made on the basis of practices applied; or they may be compiled to show what the value would be if the practices were to be applied as prescribed. (5) With complete coverage by experimental work, estimates of soil conservation benefits should be possible by areas, regions, and the Nation, eventually.

In order to make full use of all available data and to gain a maximum of dependable knowledge as rapidly as possible, it is desirable that the results of past evaluations be assembled immediately. It is probable that a large part of this data could be analyzed and interpreted in economic terms for immediate use. Moreover, it will be desirable to ascertain the extent to which past work has been deficient in terms of the land conditions covered, the quality and adequacy of results, the important problems encountered, and the mistakes that should not be repeated.

Now let's take a look at this proposal from the standpoint of methodological difficulties, statistical accuracy, and the usefulness of results. So far as methodology is concerned, the techniques are well known to all who know the work of agricultural scientists. By check plot and contiguous field testing it is possible to hold all factors in control, except the specific practice that is being tested. The

results of the tests, if properly checked, are applicable under similar conditions, in any location. The difficulty of measuring benefits through a conglomerated income is avoided. The matter of price is in complete control. The physical results may be interpreted directly in terms of enterprise income, or they may be budgeted as farm income, according to the extent that the particular combination of practices are usually employed by farms of various types within the same resource area.

The matter of sampling a highly variable universe is greatly simplified. Actually there is little or no need for universe sampling because the expansion of results from representative plots may be accomplished by extensions to soil associations, soil types, or "land-use capability classes." The existence and extent of these more or less homogeneous soil groups is a matter of actual survey.[19] There is reason to believe that the accuracy of extending experimental results on this basis would be much greater than could be obtained by the sampling of attributes in an uncontrolled highly variable universe.

The results of this method are useful in the appraisal of conservation because they are based on known and controlled test work. The high degree of dependence placed in agronomic and plant genetic experimental work is indicative of the probable general acceptance of a systematic testing of conservation measures. Moreover, the isolation of the benefits for specific conservation practices, and for combinations of practices, is highly desirable in appraising a conservation program. The useful portions of a proposed program may be relieved of the burden of carrying idealistic and low-return practices which become associated with programs of this type from time to time.

One criticism which has plagued the historical method is likely to be applied in this instance—the long time required. There is no alternative to the employment of sufficient time for testing conservation, although controlled experiments should shorten the time required, compared with that required by the historical farm income approach. The testing of a new strain of wheat takes time, but, if properly done, the results are satisfying and there is no doubt about the answer. Time is required for such procedures and there is no substitute, except unfounded guesses. Knowledge of soil con-

[19] To the extent that soil association and landuse capability surveys are incomplete and imperfect, extensions of results to a particular universe would be limited.

servation benefits will grow in value as a picture of the flow of benefits over time is developed.

The importance of measuring the *impact of conservation* on the economy of farm units has been the usual criticism of any approach not using (final) farm income as the medium of measurement. Except for the basic economic consideration of costs and benefits, however, this plea seems to be more myth than principle. Actually, any factor that enhances the economy of the several farm enterprises obviously cannot have a negative impact. It is true that the imperfections of farmer application are likely to result in lower benefits than will accrue from carefully controlled experimental work. Even so, the probable error in estimating actual benefits by experimental methods will not be beyond reason. Field tests under farm conditions should eliminate this criticism. In fact, entire farms might be operated experimentally for evaluating the economic effectiveness of soil conservation practices.

There seems to be no substantial reasons why land-use adjustments and combinations of practices may not be evaluated experimentally. The testing of the relative benefits that may result from practices applied singly and in combination are important aspects of the problem. In some cases total net benefits may be greater if a combination of practices are employed, whereas in others the "intensive margin" may be reached quickly. On the other hand, individual testing is essential to determine whether a particular practice should be applied under any circumstances.

There are several additional needs for accurate experimental data of this character. For example, intelligent farm planning requires basic production data relative to the application of conservation practices. The use of farm budgets, either as an aid to planning or for making advanced estimates of land values, demands this type of basic information.[20] These data are grossly inadequate at present.

Other Methods

In behalf of farm planning for conservation, additional methods of evaluation have been proposed. Among them are (a) *Farmer*

[20] A recent suggestion that conservation improvements increase land values equivalent to their cost, as a basis for credit, emphasizes the need for accurate information of this kind. (See D. R. Francis, *Bank Credit by Soil Conservation*, Federal Reserve Bank of St. Louis, 1946, p. 31. Also see J. D. Black, *Tailored Credit for Land Improvements*, this JOURNAL, May 1946, pp. 596–604.)

Opinion Surveys, (b) *Case Studies of Individual Farms*, (c) *Segmental or Specific Practice Studies*, and (d) *Tailored to Order or Special Problem Studies*.[21] All of these approaches have merit under certain circumstances. In general, however, they are more adaptable to the study of administrative problems associated with the application of conservation programs, and the planning of individual farms in the interest of conservation. They are not suitable for making area or regional estimates of economic benefits.

Conclusions

It is obvious that government programs should not be based solely on idealism. The wise appropriation of public funds and the intelligent application of conservation programs demand cost-benefit evaluations. It is undesirable to strive to achieve conservation on the one hand and to make wasteful expenditures for uneconomic programs on the other. The foregoing examination of evaluation methodology has indicated the following:

1. It is very difficult to develop a procedure to isolate the potential benefits of conservation practices through the measurement of gross or net farm income that will provide usable results.
2. A procedure for sampling the Nation's farms, as a basis for measuring the results of a single factor that is subject to such a wide variety of natural conditions, would be extremely involved.
3. A systematic evaluation of soil conservation practices should be set in motion. The basic procedure should be the *experimental method* described above; and it should be designed to facilitate economic interpretations.
4. To gain a maximum of information promptly, two steps might be taken. *First*, collect and evaluate all the test plot and field test data now available in the Soil Conservation Experiment Stations and the State Agricultural Experiment Stations. *Second*, resurvey the identical farms which were the basis for the *historical method* evaluations started in 1936 in a few selected project and camp areas; make field appraisals of the measures installed 8 to 10 years ago; and determine the extent to which practices started at that time have been continued,

[21] Neil W. Johnson, *op. cit.*, pp. 18–24.

together with the reasons why they have not been, where appropriate. The maintenance of numerous installations should be observed carefully, and their relative value should be appraised. This would provide an approach to answering some of the questions concerning the practical aspects of applying conservation practices.

5. As more reliable experimental data become available, economic evaluations should be extended and kept current. Such data will provide the basis for more accurate farm plan budgeting, and for making more reliable appraisals as bases for the extension of credit.

INTEGRATION OF MARKETING AND PRODUCTION SERVICES BY FLORIDA CITRUS ASSOCIATIONS

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AS farmers become proficient in one type of cooperative effort, they usually attempt new fields of activity. Associations having performed satisfactory country point marketing service may extend their marketing service to the terminal markets, or the members may form a service cooperative such as finance, insurance, or electricity. Florida Citrus Cooperatives since 1909 have, on the whole, rendered a satisfactory packing-selling service. The big development of citrus cooperatives in recent years has been in the field of production. The Florida development is unique, not only because it covers the entire field of citrus production, but—at least to some extent—because it is completely integrated with the marketing service.

Development and Extent of Cooperative Production Services

Approximately one-third of the Florida citrus marketing associations have available for their membership production services that cover everything from clearing and fencing land and setting trees to spraying, dusting, fertilizing and plowing the groves. Another one-third perform all the major production services and the remaining one-third, which for the most part are small associations, have not instituted production services. Because practically all the large associations have instituted the production services, well over half the members of Florida citrus associations may avail themselves of the complete production service, and perhaps 80 percent have access to the major production services. There is hardly an association in the State which has not instituted production services, or is not considering it.

Out of a sample of 27 associations for the 1944–45 season, 17 rendered important production services to their members, and at least ten of these rendered services covering the entire field of production. The type of services rendered and the extent used by the members is given in Table 1. In general, citrus associations require

* The author is indebted to Dr. C. V. Noble and Mr. A. H. Spurlock of the University of Florida and Dr. J. Wayne Reitz, Economic Counsel of the United Growers and Shippers Association, Orlando, Florida, who read the paper and made helpful suggestions.

the member to market his fruit through the association, but the use of the production service is optional. It will be observed that approximately 70 percent of the members and 70 percent of the acreage use the production services of the association. It is not true, as one might expect, that those members not using the production services of the association always do their own work. In addition

TABLE 1. PRODUCTION SERVICE PER ASSOCIATION RENDERED BY 27 FLORIDA CITRUS COOPERATIVE ASSOCIATIONS, 1944–45 SEASON*

Service	Number associations	Members			Acreage			Average acreage of members serviced
		Total	Using service	Percent using service	Total	Using service	Percent using service	
Cultural	17	124	87	70.2	2690	1776	66.0	20.4
Spraying	17	125	94	75.2	2740	1943	70.9	20.7
Dusting	13	119	85	17.2	2967	1991	67.1	23.5
Pruning	12	132	90	68.2	2733	1758	64.3	19.5
Irrigation	10	135	58	43.1	3021	1275	42.2	21.9
Fertilizing	17	125	98	78.8	2739	2062	75.3	21.0

* The author is indebted to Mr. J. K. Samuels of the Farm Credit Administration, Washington, D. C. for his assistance in obtaining the data in this table.

to the cooperatives there are both individuals and corporations performing production services for growers. Some of these offer a complete service, whereas others offer a specialized service such as spraying, dusting or disking. Some of the members do look after their own groves, but it is often the case that such growers, unless very large, will perform services also for several other growers in order to make possible a more complete utilization of equipment and labor.

A condensed profit and loss statement of the production department of 18 associations is shown in Table 2 for the 1944–45 season. The revenue per association was $91,633.40, which is roughly from one-fourth to one-third of the gross revenue for both marketing and production services. Services, on the average, cost $1,200 per member for members using the service. This does not include the fertilizer material, but does include the application of the fertilizer. A limited number of associations have fertilizer mixing plants. Raw materials are purchased and the formulas are made according to the needs of the individual groves. One association in 1943–44 made 23 different formulas and used, without mixing, 17 different raw ferti-

lizer materials.[1] A somewhat larger number of associations have their own plants for making spray materials. Other associations purchase prepared spray materials and ready mixed fertilizers.

Usually associations, particularly large associations, have an experienced and well trained horticulturist in charge of the production services. In addition to the horticulturist some associations have a highly trained entomologist and pathologist in charge of pest control.

TABLE 2. AVERAGE PROFIT AND LOSS STATEMENT OF GROVE PRODUCTION SERVICE DEPARTMENTS FOR 18 ASSOCIATIONS FOR THE 1944–45 SEASON*

	Amount per association	Amount per member
Revenue	$91,633.40	$1,205.69
Expenses:		
Salaries	$ 1,937.78[1]	$ 25.50
Labor	36,997.02	486.80
Materials	27,332.89	359.64
Repairs of equipment	6,782.33	89.24
Miscellaneous supplies	10,212.87	134.38
Equipment rental	384.67	5.06
Outside grove work	551.23	7.25
Office supplies expense	80.80	1.06
Telephone and telegraph	79.88	1.05
Travel	919.67	12.10
Interest	139.61	1.84
Insurance	790.06	10.40
Taxes	223.08	2.94
Depreciation	3,445.33	45.33
General expense	1,052.78	13.85
Total	$90,930.00	$1,196.44
Income	$ 703.40	$ 9.25

* The author is indebted to Mr. J. K. Samuels of the Farm Credit Administration, Washington, D. C., for his assistance in obtaining the data in this table.

[1] Because of the method of allocation of sales between the functions of marketing and production services, this is perhaps a little low. However, it is the actual amount allocated to the production services.

Members of the associations may put their groves in complete charge of the association. In such cases the horticulturist is charged with the entire responsibility of the production of fruit on the grove. He not only designates the amount of fertilizer but the kind and time of application. He determines also the time of spraying and kind of materials to be used. All cultural work is at his discre-

[1] This includes minor elements and also different sources of the major elements.

tion, as well as pruning and replacing of old or diseased trees with young trees. The need of tree surgery also is left to him. Other members may dictate the needs of their groves and instruct the horticulturist what is to be done and how and when it is to be done. Still other members may delegate only a part of the operation to the horticulturist and control certain operations themselves. All members, of course, are at liberty to consult with association officials about their production problems. Perhaps the care that the grove is to receive is decided more than any other way, in conference between the grower and horticulturist.

TABLE 3. NUMBER OF CITRUS MARKETING ASSOCIATIONS PERFORMING GROVE CARETAKING SERVICES, BY NUMBER OF SERVICES PERFORMED AND BY SEASONS, 1925–26 TO 1939–40, INCLUSIVE

Season	Number of services performed								Total number of associations	Associations performing caretaking service
	1	2	3	4	5	6	None	Unknown		
1925–26	2	1					50		53	3
1926–27	2	2					49		53	4
1927–28	3	3					47	1	54	6
1928–29	3	6					47	2	58	9
1929–30		9					46	3	58	9
1930–31		7	1	1			44	4	57	9
1931–32	2	7	1	2			40	5	57	12
1932–33	1	7	3	2			35	3	51	13
1933–34	3	6	6	2	1		24	3	45	18
1934–35	4	9	5	4	1		27	5	55	23
1935–36	4	8	4	6	2		21	3	48	24
1936–37	4	7	7	5	1	3	19	1	47	27
1937–38	4	6	6	7	1	4	16	1	45	28
1938–39	4	5	3	9	3	4	14	1	43	28
1939–40	4	3	2	9	3	4	13	1	39	25

Source: H. G. Hamilton and A. H. Spurlock *Farmers' Cooperative Associations in Florida—Florida Agricultural Experiment Station Bulletin No. 386.*

Cooperative spraying was first done in 1914 and dusting was started one year later. Other services are of more recent origin; some, such as irrigation, have been added quite recently. The pattern that production service has taken since 1925 may be observed in Table 3. In 1925 a few associations performed only a limited number of production services. Later other services were instituted and other associations entered the field of production service. For the 1925–26 season only 3 associations, or 6 percent, offered a total of two services, and only one of these associations offered both services—the other two associations offered only one service each. By

the 1939–40 season 25 associations, or approximately two-thirds of the associations, were offering at least one service and some performed complete production service. The pattern of development, in our opinion, is healthy. As experience was obtained and techniques developed, associations were called upon by their members to render other services. Such a development speaks well for cooperative effort and for those responsible for the movement. At the present time all the large associations have production service departments, unless their members are served by efficient individual or auxiliary firms.

TABLE 4. RELATION OF PRODUCTION SERVICES TO PRICES RECEIVED FOR FRUIT, CITRUS COOPERATIVE ASSOCIATIONS, 1925–26 TO 1939–40

Season	Cooperatives without production service		Cooperatives with production service	
	F.O.B. price index	Grower price index	F.O.B. price index	Grower price index
1925–26 to 1929–30	92	84	100	101
1930–31 to 1939–40	95	86	101	100

Source: Adapted from H. G. Hamilton and A. H. Spurlock *Farmers' Cooperative Associations in Florida, Florida Agricultural Experiment Station Bulletin No. 386.*

Cost data are not available to show the relative efficiency of cooperatives as compared to individuals, or corporations with respect to production services; however, a recent study indicates that members using the production service of cooperatives have slightly higher prices for their fruit than members not using the service.[2] It is true also that cooperatives with production departments receive slightly higher prices than associations without production departments (Table 4). It is not definite that the production department is entirely responsible for the higher price shown in Table 4. Since associations with production departments were larger, they may have been able to receive slightly higher prices because they could better meet the demand of the markets. It is likely that the production service is one factor that enables associations to have large volume.

In Florida, as in some other sections of the country, it is a com-

[2] A thesis, presented to the Graduate School of the University of Florida, July, 1946 by Marshall R. Godwin, shows that members using the production services of an association over a period of 11 years received about 6 percent higher prices than members not using the production services.

mon practice for marketing associations to purchase production supplies for members. Where the supplies are not purchased for members, Florida associations often extend credit to members for the purchase of these supplies; however, only in the case of citrus have cooperative marketing associations to any extent instituted production services. To our knowledge, except in one case where the production cooperative is so closely related because of personnel that it is practically the same as a department, no cooperative has succeeded in the function of citrus production alone. It has only been when it was integrated with the marketing service that the production service has succeeded. There is one cooperative, excluding the one just referred to, that is now performing production service in a very limited way and does not perform marketing services; however, originally the association was organized only for marketing functions, later added the function of production, and then discontinued the marketing function. The production activities carried on now by the few remaining members would hardly justify a charter since it is largely a one-man affair in which services are performed for a limited number of members.

Two questions naturally arise in connection with the development of cooperative production services: (1) What are the conditions that make cooperative production possible? (2) Why is the production service integrated with the marketing service?

Conditions Favoring Cooperative Production Services

The type of farming—absentee ownership, and ownership by professional men who are too busy to devote attention to their groves and who are often inexperienced and uninformed with respect to their production problems—seems to te the chief reason that makes cooperative effort possible, while a better utilization of personnel and equipment seems to be responsible for integrating production services with marketing services.

Citrus growing in Florida is highly specialized and is concentrated into relatively small areas. The income from citrus is about 2/5 of all agricultural income, yet only about 1 1/4 percent of the State land area, or 1/20 of the farm area, is devoted to citrus production. Some of the best citrus lands are of little value for general farming or vegetable growing except for watermelons. Groves vary greatly in size, but in general are small; the average size of groves using production services in 1944–45 was approximately 20 acres. Usually

there is no land in other crops or pasture for animals, often there are no buildings and in some cases no fences. Efficient production of citrus requires expensive machinery and equipment. Value of machinery used on a ten acre grove often exceeds the value of the grove; particularly was this true before values were greatly increased because of conditions resulting from the war. The total time that such equipment is used does not usually exceed a few days in the course of a year. For example, there are spray machines that will effectively cover a 10 acre grove in an hour. Because of this factor, it is not practical for growers to own their equipment for small groves unless they use it in taking care of other groves.

Similar difficulties result from the use of labor. Much of the grove work requires two or more men working together for the greatest efficiency, which means that if a grower is going to confine his operation to a small grove he will need for short periods of time usually not less than two men in addition to himself, but most of the time there would be no work for these men to do. Furthermore, there are practically no rainy day jobs to be done on a grove as is often the case on a general farm.

Citrus real estate developments, although not necessarily a factor that makes cooperative production services possible, nevertheless have been a contributing factor. Often these citrus development companies planted groves in several hundred acre blocks and sold them in units of five acres or multiples of five acres. With the purchase of the grove, the buyer often entered into contract with the real estate company to care for it. In some cases the development company failed; in other cases growers became dissatisfied with the service. This often resulted in a number of growers finding themselves in the position of owning groves adjacent to other growers in the same predicament with no equipment and with too small a unit for efficient operation. It was good business for these adjacent owners to seek some cooperative arrangement to solve their problem. In a few cases these growers formed a cooperative to handle not only their marketing problems, but also their production problems. In other cases these growers, or a part of them, would affiliate with existing cooperatives. Real estate developments of this nature were, and may be in the future, conducive to both marketing and production cooperative effort, for they leave the grower without means of marketing or production. Such situations are favorable for cooperative production because the acreage of small

owners is grouped in large blocks of several hundred acres, a condition which lends itself well to big machine operations.

Absentee ownership, of which there is much in Florida, is a factor favoring cooperative production. Absentee owners living out of the State must make arrangements for someone to handle their production and marketing problems. Some cooperatives have members who may not see their groves in several years, and often members see their groves only once a year. Many out-of-state owners have joined cooperatives and turned their entire grove operation over to the cooperatives.

Closely akin to the out-of-state member is the member who lives in the State but not on his grove, and there are many of these. He is often a professional man without grove equipment, time, and often without knowledge to devote to citrus fruit production. These members look on their grove as a place to invest money in the same way they look upon investment in corporations. Often they give no more attention to their grove than they do to some corporation in which they own stock, which is little more than attending directors' meetings, if they happen to be a director, or stock-holders' meetings. These grove owners, who are busy with professional life, often feel that it is better business to employ well trained horticulturists than it is to try and keep informed on production problems themselves. By working on a cooperative basis they are able to get highly trained men and efficient equipment at reasonable prices.

In the case of both the absentee owner, who lives out of the State, and the professional man living in the State, it is not a question whether they will perform the production service themselves or hire someone else, but rather it is a question of hiring an individual, a cooperative, or a corporation to take care of their groves. For this type of grove owner cooperatives seem to be in a position to render a satisfactory service.

There is, of course, the owner who lives on his grove and does his own production work. He is in a different position from the absentee owner or the professional man, but he, particularly if he is a small grower, finds it difficult to compete with large growers, cooperatives, or corporations in the production of citrus fruit because of the necessity of heavy investment in equipment and high degree of specialization, without any other enterprise on which he may use his equipment or labor. Such growers have one of two courses to follow. He may join a cooperative and, as some do, secure employ-

ment from the cooperative, or he may enlarge his business by caring for the groves of other growers; however, if he chooses the latter he often has to borrow money to finance his operation. For credit he may turn to a commercial bank, production credit association of a cooperative marketing organization. In Florida, marketing firms - whether cooperative or not—have for years either purchased production supplies for growers or loaned them money with which to purchase these supplies. The practice of marketing firms extending credit for production purposes is considered undesirable by some cooperative authorities; however, the experience of some of Florida's most successful cooperatives is that where the marketing and production services are so completely integrated, as in Florida, the practice is sound.

Cooperative Production Services Integrated With Marketing Services

The advantages of cooperative production service are not confined solely to the member; the cooperative itself benefits from the service. The marketing of citrus fruit in Florida extends over a period of from 4 to 8 months. It is, therefore, a problem to utilize key employees at full capacity throughout the year. Either employees must obtain several months leave, or have what amounts to a long vacation with pay. Neither is satisfactory, but marketing cooperatives have found that when production services are integrated with the marketing function a considerable part of the office help can be productively employed, and most of the key men such as field foremen and mechanics can be used in the production department in the off season marketing period. In addition to a more efficient use of employees, much of the equipment used in the marketing function may be used also in the production function; particularly is this true for some types of trucks and tractors.

In addition to the economies of employees and equipment, other economies result both to the member and to the association. It will require no more time, in most cases, for the grower to look after both his production and marketing problems where the work is integrated than to look after one of these problems when done by separate firms; likewise, it requires but little more time for the manager to deal with the member on both marketing and production than for one. It is easier for the management to determine the effect of production practices on quality of product in an integrated set-up than in a specialized set-up because all, or at least most of the facts, are known. If fruit is of poor quality, the production practice

may be checked in an effort to determine the cause; but under a specialized set-up, if the quality is poor, it may be difficult for the marketing firm to determine the responsible production practice and in some cases if it were known it might not be possible to get the practice changed. With integration the management can be held for whatever mistakes occur, and if a good job is done it does not have to share the credit.

Dangers of Integrating Production and Marketing Services

Under Florida conditions, where the type of citrus farming is highly specialized, where the grove holdings are often small, where there is absentee ownership and ownership by people who cannot give personal supervision to their groves, much can be said in favor of cooperative production. Furthermore, because of better use of employees' time and equipment, economies result by integrating the production with the marketing service. Such a system has serious difficulties, however, particularly with respect to integrating the two functions of marketing and production. In the first place there is little diversity of income from the farming operation. When prices are low, as they will be again, the marketing function has no way of tiding over the production function because low prices hit the grower who is responsible for paying for both services. Of course, each service should stand on its own feet; however, if the crop brings red ink it is difficult to secure from the grower funds to cover the marketing charge. Since the practice of rendering the production service is on a credit basis, it will be even more difficult for the grower to pay for the production service if the crop fails or prices are low. It is true that with continuing crop liens the crop next year may be collateral for the carry-over debt; however, funds must be forthcoming for producing the next crop. The situation is more serious when the grower has put the grove in charge of the association and the association has accepted this responsibility. Under such circumstances the member is inclined to say that the responsibility of making the grove pay, or at least to see that the grove makes production costs, rests with the association. The hazards inherent in the situation are so great that no association should assume this responsibility. Neither should the association assume responsibility for making marginal groves pay, even with normal prices.

Immediately preceding the 1941 emergency some associations

were not in too sound a financial position, and at least a part of it was due to the production service operations and the policy of loaning the member money for production purposes. In four associations out of twenty-four for which data were available at the close of the 1939–40 season, the members' accounts receivable exceeded the value of the fruit marketed during the season. One association had $1.13 per box (for boxes marketed in 1939–40) at the end of the 1939–40 season in members' accounts receivable. The seriousness of this situation is readily realized when the $1.13 per box in members' receivables is compared with $.53 per box, which was the amount members, on the average, received that season for fruit. This association began the 1940–41 season with twice as much in members' accounts receivable as was received for fruit the previous season. Since $1.13 per box was the average for all members it is quite possible that some members owed the association $2.00 per box, or four crops, on the basis of 1939–40 conditions. Because of the increase in fruit prices and a more conservative policy on the part of this association at the end of the 1944–45 season, members' accounts receivable was only $.03 per box and prices received averaged $2.21 per box. It is not good business to depend on a war to bail you out of such tight places. A mere recognition of what happened four or five years ago is no guarantee that it will not happen again. If associations are to perform production services successfully, a system of adequate reserves should be instituted at once. In brief, it involves the grower building up a reserve equal to one year's production expense. If the reserve should be impaired for any reason, it must be restored with adequate collateral before the next year's operations are financed. Not many of the citrus associations have established such reserves. Most citrus associations are in good financial condition at the present time; particularly is this true with respect to members' accounts receivable, which amounted, on the average, to only $.11 per box at the close of the 1944–45 season crop.

The average net worth for 29 Florida citrus associations at the end of the 1944–45 season was approximately $300,000.00, and in some cases the net worth exceeds $1,000,000.00. When it is realized that this represents about 85 percent of the assets it is a creditable position; however, the cost of producing fruit is so great that an unwise production policy could easily wipe out this amount in a relatively short time.

MEASURING THE FAMILY FARM

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THERE are many different concepts of the family farm, reflecting lack of agreement as to the fundamental nature of this institution. Likewise, there are wide differences of opinion with respect to the desirability of encouraging, through government programs, all kinds of family farms or only those having certain characteristics. It is the purpose of this paper to discuss some of the general concepts of the family farm, together with some of the current definitions used to describe particular kinds of family farms. Finally, an attempt will be made to frame some improved definitions.

Concepts of the family farm may be grouped into 2 classes, functional and purposive. The functional concepts are intended to describe the fundamental ways in which farming on family farms differs from other kinds of farming. The purposive concepts are meant to describe the kind of farm that will advance certain desired ends, such as adequate income, continuity of tenure, or employment of family labor.

Functional Concepts

In the minds of many people the family farm is an enterprise possessing certain unique characteristics not common to other kinds of farm business. Numerous attempts have been made to define these essential qualities.

The most commonly mentioned characteristics of family farms include the combination of home and business life; the tendency for a greater proportion of family living and farm production cost items to be raised on the farm; and the predominant role of the operator and his family in labor and management. The first two of these do not furnish a satisfactory basis for a definition of the family farm. The combination of home and business is common to most sizes and kinds of farms. The tendency for family living and production goods to be produced on the farm is more truly a characteristic of subsistence farming than of family farms. It would appear that the fundamental distinction between family farms and others must lie in the relationship between the farm family and farm work and management.

While occasionally the family farm is defined as one on which the family does all the work, the fact that some labor is hired on rather small farms makes such a definition of questionable value. According to the Census of Agriculture, 12 percent of the farms reporting sale or home use of farm products worth from $1 to $99 in 1939 hired some labor. For farms with products valued at $600 to $749, the proportion is one-third and it is almost half in the value group $1,000–$1,499 (Table 1).

TABLE 1. NUMBER AND PROPORTION OF FARMS REPORTING EXPENDITURES FOR HIRED LABOR 1939, BY VALUE OF PRODUCT GROUPS*

Value-of-product group	Farms	Farms reporting expenditures for hired labor	
	Number	Number	Percent
All classified farms:**	5,968,755	2,247,850	38
Dollars			
1– 99	332,195	38,319	12
100– 249	812,810	124,086	15
250– 399	821,616	166,465	20
400– 599	870,629	233,905	27
600– 749	479,481	160,057	33
750– 999	574,094	227,279	40
1,000–1,499	708,917	349,283	49
1,500–1,999	416,081	242,006	58
2,000–2,499	264,020	171,462	65
2,500–3,999	375,973	268,608	71
4,000–5,999	165,679	134,209	81
6,000–9,999	88,947	78,444	88
10,000 and over	58,313	53,727	92

* *Census of Agriculture, 1940*, "Farm Characteristics by Value of Products," Ch. VIII.

** Does not include farms with zero value of products or not reporting.

Other definitions recognize that some labor might be hired on family farms. For one of these, family farms are said not to *depend* on hired labor.[1] It is sometimes held that a farm continues to be a family farm as long as the amount of family labor, including that of the operator, exceeds the labor hired. From Table 2 it may be seen that, as of 1939, the proportion of workers who were family members was more than half for all value-of-product groups below

[1] See O. R. Johnson, "The Family Farm," this JOURNAL, XXVI (3), p. 530. August 1944.

$4,000. For the group $4,000–$5,999, the proportion was a little more than half in March, but less than half in September. While there may be considerable practical value in distinguishing between family farms and larger farms on the basis of quantity of labor hired, the question may be raised as to whether this is a functional

TABLE 2. FAMILY WORKERS: AVERAGE NUMBER PER FARM REPORTING, AND PERCENT OF ALL FARM LABORERS, BY VALUE OF PRODUCTS, MARCH 24–30, 1940 AND SEPTEMBER 24–30, 1939*

Value-of-product group	Farms reporting family labor		Family workers			
			Average per farm reporting		Percent of all farm workers***	
	March	September	March	Sept.	March	Sept.
	Number	*Number*	*Number*	*Number*	*Percent*	*Percent*
All classified farms:**	5,013,488	4,857,749	1.57	1.66	81.8	72.2
Dollars						
1– 99	234,989	225,913	1.29	1.31	94.4	92.4
100– 249	639,324	616,252	1.39	1.45	93.9	91.2
250– 399	685,578	666,806	1.48	1.60	93.4	89.6
400– 599	749,546	728,385	1.54	1.70	92.3	86.1
600– 749	419,640	406,944	1.62	1.77	91.1	83.4
750– 999	499,448	484,883	1.63	1.75	88.0	79.1
1,000–1,499	618,587	600,487	1.66	1.74	85.2	74.7
1,500–1,999	362,011	349,752	1.68	1.73	81.3	68.9
2,000–2,499	229,073	221,051	1.68	1.73	77.7	63.9
2,500–3,999	323,620	313,962	1.69	1.72	70.6	57.0
4,000–5,999	138,008	134,434	1.75	1.78	58.4	44.7
6,000–9,999	72,081	69,259	1.72	1.74	44.5	33.0
10,000 and over	41,588	39,621	1.68	1.71	17.1	11.6

* *Census of Agriculture, 1940*, "Farm Characteristics by Value of Products," Chapter VII.

** Does not include farms not reporting or with zero value of products.

*** On farms reporting family labor.

distinction. The essential functional difference would seem to lie in the relationship between work and management, rather than in the relative numbers of family and hired workers on a farm, although these two no doubt are interrelated to some degree. This is the basis of differentiation suggested by Dr. G. F. Warren: "Even with three (hired) men the farm still has the characteristic of the family farm. The farmer and his sons work with the men."[2]

[2] G. F. Warren, *Farm Management*, Macmillan 1918, p. 240. While this passage

An English definition of the small holding—an establishment similar in many ways to a small family farm—expresses about the same idea, but also excludes the use of hired labor: "Generally speaking, the medium-sized farm differs from the small holding in that, first, the occupier needs to employ wage labour, and secondly, there is a certain division between manual labour and the work of organization."[3]

What is this "certain division between manual labour and the work of organization"? If it is taken to mean that management and labor are specialized functions carried on by different individuals, there are relatively few American farms that are too large to be called family farms. Warren recognized this situation and refers to all farms larger than family units as "bonanza farms." It appears that there is considerable variation by type of farm; few plantations would qualify as family farms even though they might be only of moderate size, while many extensive ranches and wheat farms would be family farms.

If, however, the essential functional distinction between family farms and larger units is considered to lie in the degree of direction and control over the worker, the boundary between family farms and others must be drawn farther down the scale. It has been pointed out by Louise Howard in an exhaustive study of labor in agriculture, that in its essentials, the employer-employee relationship in agriculture is no different from that in other industries. Where there is one employee on a farm he may enter into rather special relations with his employer, such as living with the farm family, for example. "Yet even in these cases, and quite without question as soon as 2 or 3 workers are found on the same farm, the position of the agricultural wage earner is substantially the same as that of employed persons in other industries."[4] In terms of the employer-employee relationship, it might be logical to set the upper limit of the family farm at the point where more than half the work is done by hired labor, if this statement holds true for all farming areas.

A rather close parallel can be drawn between the kinds of agri-

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indicates that a family farm might have three hired men or more, there is a statement earlier on the same page that the family does most of the farm work on the family farm.

[3] Edgar Thomas. *The Economics of Small Holdings*, Cambridge University Press. 1927, page 2.

[4] Louise Howard. *Labour in Agriculture*. Oxford University Press. London. 1935, page 32.

cultural organization and the different industrial systems. Thus, the family farm might be compared with the handicraft system, and large-scale farms with the factory system; the essential distinction being that, in the handicraft system and on the family farm the worker, even though he may use power tools, "is not paced by the machine."[5] In other words, the direction and control of production is largely in the hands of the worker. One might also find a parallel to the putting-out system in certain western areas where farmers contract to fatten cattle and sheep belonging to others, leaving the marketing to the owners of the livestock.

While economic historians seem to be in general agreement as to the essential characteristics that distinguish the forms of industrial organization, they usually do not attempt to establish precise boundaries between them. It is recognized that individual producing units may, at any one time, possess some of the characteristics of one system and some of another, and that over a period of time there may be some change in the characteristics of an entire system.

When precise definitions have been needed they have been coined to meet the problem at hand. For example, in order to administer factory laws, it has been necessary from time to time for "factory" to be defined, and there is general recognition that these are working definitions phrased for specific purposes.

In the field of agriculture there is still a tendency to grope for a single, precise, definition of the family farm that will serve all purposes. There is also a contrary tendency to use the term without any definition at all, or in a vague way that makes its meaning incomprehensible. Thus it is not uncommon for someone to say "I favor the family farm, and by family farm I mean one on which a family can make a living" or to include a statement like this in a definition: "It is not so much a unit or a quantity as it is an operating relationship whereby a farm family earns a satisfactory level of living and a substantial degree of security."[6] Sometimes operator ownership is made a requirement of the family farm. A recent publication of the United States Chamber of Commerce, with no attempt at definition, identifies the family-type farm with full-time low-income farming and seriously questions its value to society.[7]

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[5] From definition of handicraft system. *Encyclopedia of the Social Sciences*, Vol. 7.
[6] C. S. Hoffman. *Land Policy Review*. June 1942, pp. 25–27.
[7] *Variations in Farm Incomes*, Agricultural Department, Chamber of Commerce of the United States, March 1945, pp. 20–21.

To avoid all this confusion there is need for agreement on the fundamental nature of the family farm. But it must also be recognized that to meet specific needs several purposive definitions may be in use, each of them correct as long as it is consonant with the general functional concept. A family size farm, for example, is a particular kind of family farm.

It would seem that the most defensible concept of the family farm would be in terms of degree of control and direction over the worker. A farm should not be called a family farm if most of the labor is employed under conditions similar to industrial employment.

This concept does not provide for any lower limit to the size of family farm. Subsistence farms, part-time farms, and other small scale units of production are family enterprises fully as much as larger family units. However, several sub-classes might be recognized, such as part-time, retirement and subsistence farms. The larger family farms might be placed in one or more groups of "family-commercial" farms, a term that has been suggested for family farms from which sales of products in commercial markets are fairly significant.[8]

Purposive Definitions

Those who favor the encouragement of family farms are usually not particularly concerned with the characteristics of the family farm *per se*. They are more interested in describing the kind of farm that will best further the goals of family farming: adequate incomes; maintenance of the soil; thriving rural communities; political stability. In other words, they have in mind only a part of the whole category of family farms and they define the family farm in terms that apply only to the special group they are interested in. This fact is not always recognized and is responsible for much of the confusion about the nature of the family farm.

One of the most common of these definitions is in terms of adequate income, but this by itself is not a satisfactory measure. To arrive at "adequate income" the usual approach is to set up a list of goods and services a typical family should have, determine the income needed to cover the cost of these, and then describe the size and type of farm that will give this income with average manage-

[8] Benedict, Elliott, Tolley and Taeuber. "Need for a New Classification of Farms," this JOURNAL, XXVI (4), p. 702, November 1944.

ment. Setting up the essential needs of families is a rather arbitrary procedure.[9] There is wide variation between regions and individual families in the goods and services the families themselves consider essential.

There is great variation in the incomes different farmers will obtain from identical farms—"no size of farm is large enough to insure a profit"[10]—therefore, some level of management must be specified in an "adequate income" concept. Proper size of family farms according to any income concept would vary with changes in prices and costs. At any one time the size of farm that would be considered adequate would depend upon whether it was owned or rented and whether mortgaged or free from debt.

Most of the definitions of family farms in which adequate income is used as one of the criteria are noncommittal with respect to the precise amount of income needed. Many of them go only so far as to say that such a farm should provide a "satisfactory living" or an "acceptable living." Even those which attempt to be more specific leave a great deal unsaid. The following definition, which uses a "good living" as one requirement of the family farm is typical of several of this kind.[11] "By a good living we mean one that enables the family to be well clothed, to enjoy an adequate diet, to educate the children, and to participate in community affairs." Does this definition mean that the family can afford to buy most of its clothing ready made or must it be made at home? Is the adequate diet one of minimum cash cost, or does it permit a wide variety of foods? Does education include the cost of college training for the average number of children? These questions illustrate the difficulty of framing a specific and generally acceptable definition of adequate income.

One approach, developed in one of the Columbia Basin irrigation studies, avoids some of this difficulty.[12] This method is based on actual expenditure patterns of families in a given area. These families are arrayed according to their net farm incomes in order to determine the income level at which income and expenditures for living are about equal. It is suggested that this might set a lower

[9] "Such budgets rest on slight scientific or pragmatic foundations. The exception is, of course, food." Lloyd Fischer, "What Is a Minimum Adequate Farm Income?" this JOURNAL, XXV (3), p. 662. August 1943.

[10] G. F. Warren. Opus cit., page 244.

[11] J. G. Morgan, in *North Dakota Farmer*, Dec. 8, 1945, page 20.

[12] Lloyd H. Fisher, Opus cit., pp. 662–670.

limit to the income objective. At a considerably higher income level a point is reached beyond which expenditures for living increase very slowly.[13] This, it is suggested, might be taken as an upper limit to the income objective since further increases in income would largely be saved.

The point at which income and expenditures are equal represents the result that would be attained at a given income level on the average. Many families at this level would be operating at a loss. Therefore it is suggested that a desirable minimum income might be the one at which the greatest net number of "solvent" farms would be expected. That is, at each given income level, the number of expected failures should be subtracted from the expected successes. The effect of this would be to increase the minimum income level somewhat.

This procedure for estimating adequate income should if carefully applied give more realistic results than the use of an expenditure budget. The sample of families to be used in arriving at the minimum income level would have to be drawn with care so that they would accurately reflect the expenditure pattern of the kind of families under consideration. Thus, if the problem were to establish adequate sizes of farm for an area of new settlement, like the Columbia Basin, the sample should be representative of the families of new settlers with respect to age, education, family composition and other characteristics. Also, in establishing a desirable minimum income level, it might be advisable to depart somewhat from the observed expenditure pattern. It might be socially desirable to allow for some increase in expenditures for education and medical care, for example, particularly in low-income areas.

One of the difficulties in using adequate income as the sole measure is that it is not closely related to the technological aspects of farm production. A farm might return an adequate living but not furnish adequate employment to the family. It might also be inefficient in the use of equipment. For example, a farm might return an "adequate income," but be too large to be operated by one tractor and too small to justify ownership of two.

The public land laws that deal with the establishment of family farms are not explicit with respect to the kind of family farm that

[13] While Fisher, in the article cited, refers to this "point," most consumer expenditure data show the proportion of income spent for family living to follow a curve as incomes increase.

is expected to be developed on these lands. In general, however, it appears that the objective of most of these laws has been one of adequate income—providing for the maximum number of families that could be supported on the public lands in a reasonable degree of comfort. Even the various Reclamation Acts, which go farther than other public land acts in granting administrative discretion with respect to desirable sizes of farms, mention no criteria other than that the limit of acreage should be that "which may be reasonably required for the support of a family upon the lands in question."[14]

Another concept of the desirable size of family farm is in terms of what is called the "family-size" farm. Usually, this is intended to mean the size of farm that can be operated with the labor of the typical farm family, with only incidental hired help in peak seasons. Sometimes further qualifications are introduced, such as, adequacy of income and maintenance of the productivity of the farm. When qualifications such as these are included it is quite common to speak of the "family-type" farm. For example, the Committee on Postwar Agricultural Policy of the Association of Land-Grant Colleges and Universities states that a majority of farms should be family-type farms—"on which the operator, with the help of his family and perhaps a moderate amount of outside labor, can make a satisfactory living and maintain the farm's productivity and assets."[15]

As commonly used, no clear distinction is made between the terms "family-type" and "family-size," and almost identical definitions have been used to describe both. "Family-type" is sometimes used in a sense synonymous with family farm. Occasionally, operator ownership is considered an essential requirement of "family-type" farms.

The concept of "family-type" farms used in the Farm Ownership Program merits special consideration, because it presents a measure that is being rather extensively used. Something over 40,000 family farms have already been financed under this program.

The Bankhead-Jones Farm Tenant Act provides for the establishment of eligible families upon "family-type" farms. As defined in the FHA regulations, this means "a farm which furnishes full

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[14] Reclamation Act of 1902, Section 4.

[15] *Postwar Agricultural Policy*. Report of the Committee on Postwar Agricultural Policy of the National Association of Land-Grant Colleges and Universities. October 1944, page 30.

productive, year-round employment for an average farm family and one which an average farm family can operate successfully without employing outside labor, except during brief peak-load periods at planting or harvest time. In individual cases allowances may be made with respect to employing outside labor while children are too young to be of much assistance or after they have grown up and left home. A farm on which a tenant family will be expected to reside and supplement the labor of the owner and his family or on which an average family would require hired help a considerable part of the time is not a family type farm. . . . " It is further stated that these farms should "have capacity to yield incomes which will maintain an average farm family according to acceptable living standards, pay annual operating expenses, pay for and maintain necessary livestock and farm and home equipment, and pay off Tenant-Purchase and Farm-Enlargement loans. . . . "

Basing the desirable family size farm upon use of labor as well as adequate income is more satisfactory than using income alone. It might be argued that a farm can be of "family size" and employ somewhat more hired labor than is allowed in the foregoing definition. The requirement of "full year-round employment" would be difficult or impossible to meet with some systems of farming.

Dr. O. E. Baker advocates another kind of family farm which he refers to as the "two-man" farm, one that furnishes productive employment for two able-bodied men for most of the year. This is necessary, he feels, in order to encourage a grown son to stay on the farm until the father is ready to retire. If the children are born when the father is between 25 and 35 years of age they become of an age to start out for themselves when the father is between 45 and 55. It may be 15 or 20 years before the father is interested in relinquishing the active operation of the farm. It is during this period that the children become established on other farms or in other lines of work. When the father retires or dies no direct heirs are in position to take over the operation of the farm.[16]

It is held by some that keeping a farm in the family is more dependent on the family than on the farm. A recent Wisconsin study seems to indicate that where families are actively interested in accomplishing this end, relatively small farms will serve the purpose.[17]

[16] For a discussion of the 2-man farm and continuity of tenure, see O. E. Baker, in Baker, Borsodi and Wilson, *Agriculture and Modern Life*. Harper & Bros. 1939, page 169.

[17] K. H. Parsons, and E. O. Waples. *Keeping the Farm in the Family*. Wis. Research Bul. 157. September 1945.

In the area studied, an eastern Wisconsin dairy farming section, the attitude of the family together with incomes that were adequate to support the operator's family and his parents in modest comfort, were apparently more important considerations than the amount of work to be done.

Another approach to the desirable size of family farm is in terms of a "unit of organization."[18] This approach first considers those factors of production which can be used only in fixed quantity or multiples thereof—one man or one 3-plow tractor, for example. Next, the optimum input of variable factors is added to the fixed factor. For example, 1 man and 16 milk cows, or one man and 1,500 laying hens. A lack of ready divisibility may apply to more than one factor, of course, so that the unit of organization may have to be stated in terms of an efficient combination of two or more elements. The unit of organization for a wheat farm might be 1 man, a 3-plow tractor, and a 12-foot combine. This given unit would then determine the proper acreage for the farm, although the possibility for improving the divisibility of factors through custom or cooperative use must not be overlooked. Moreover, some factors that might appear to be readily divisible may not be for institutional and other reasons. Land, for example, may be obtainable only by the quarter section or some other unit.

The "unit of organization" approach, if not used in conjunction with other criteria, takes into consideration only production efficiency. The much-abused term "economic unit" is usually defined in terms of some sort of unit of organization. While the unit of organization is helpful when properly used, it can be misleading if sole reliance is placed upon it as a guide to desirable sizes of farms. For example, a Montana study[19] indicates that there are at least three reasonably efficient sizes of 1-man wheat farms, each based on a different unit of organization. The smallest, a 1-man, 3-plow tractor farm, has an optimum acreage of 800 acres. For a 1-man, 4-plow tractor unit, the optimum is 1,100 acres, and for a 1-man, 6-plow tractor combination the optimum is 1,800 acres. These are the acreages for each unit of organization which result in lowest cost per acre, assuming that quality of management is commensu-

[18] For a more comprehensive discussion of the unit of organization see H. C. Taylor, *Outlines of Agricultural Economics*, Macmillan Company, 1935, page 175.

[19] E. A. Starch. *Farm Organization as Affected by Mechanization*. Mont. Agr. Exp. Sta. Bul. 278. 1933.

rate with volume of business in each case. However, a comparison of per-acre costs for the three optimum acreages shows for the period studied a cost of $9.34 per crop acre for the 1-man, 3-plow tractor unit; $8.42 for the unit with 4-plow tractor; and $7.02 with a 6-plow tractor.[20]

Only a small proportion of Montana wheat farms are as large as the most efficient of these. The average size of cash grain farms in Montana, as reported by the 1930 Census, was 795 acres, of which 253 was cropland, 106 plowable pasture, and 255 other pasture. Only 24 percent had 1,000 acres or more, including land not cropped. While the average size of wheat farms has increased since 1930 the change has probably not been great. If lowest unit cost, assuming a fairly high level of managerial skill, were taken as the sole guide to desirable size of farm, it would appear that there is need for a large reduction in the number of wheat farms in Montana. However, this might introduce social costs that would far outweigh the gains in efficiency. In order to produce wheat at least cost, one might also conclude that there is no place in agriculture for any but the most efficient operators. Yet for many of the less efficient, smaller farms and lower net returns per acre might represent better income opportunities than any of the alternatives open to them. It should be recognized, also, that cost accounting methods may not accurately reflect real cost differences between farms of different sizes, particularly in the valuation of non-cash items such as family labor. The unit of organization is a useful measure, but it needs to be combined with other criteria, recognizing that a compromise must be made between efficiency and other objectives. Properly used, the "unit of organization" is a good point of departure because it gives recognition to the fact that increases in size of farm usually cannot be made in small increments; instead, they must conform to unit additions of indivisible factors of production, if the farm is to be operated efficiently.

Including the idea of a reasonably efficient unit of organization in the concept of the desirable size for family farms reduces the need for depending upon an arbitrarily chosen level of living. Income would need to be considered only in choosing between alternative units of organization or between a farm based upon 1 unit or made up of two or more. For example, if it is known that a 1-mule cotton

[20] This study does not give costs for farms using tractors larger than 6-plow nor for 2-tractor farms. These might, of course, show still lower per-acre costs.

farm in a certain part of Georgia[21] will return family labor earnings of about $300 with average management, while a 2-mule farm will return $470, it is relatively easy to reach a practical decision as to minimum adequate income, considering family living needs and the number and size of farms in the area. This decision involves a choice between only two alternatives, or possibly three, if a larger size of farm were to be considered. For general farms a few more choices might have to be considered because of the possibility of changing the system of farming.

Operation of a 2-mule farm or of a 2-plow tractor might call for management of a higher order than would be required for a 1-mule farm or a 1-plow tractor, but it is unlikely that a moderate increase in scale of operations would require anything like an equal increase in managerial skill if not accompanied by a change in system of farming. This is a subject upon which there is need for further research.

Summary

In order to summarize this discussion, three definitions are offered.

"A *family farm* is one on which the farm operator makes most of the managerial decisions, participates regularly in farm work, and on which his role as employer of labor is minor relative to his other functions."

"A *family size farm* is one which, operated by a family of average size and managerial ability, will permit reasonably efficient use of labor-saving equipment and of the family labor force over the life cycle of the family."

The family size farm thus described might have some hired labor if needed to secure the efficient use of family labor or equipment. Efficient use of equipment does not mean that all machines must be used exclusively on one farm. Provision could be made for custom or cooperative use of expensive machines needed only a few days each year. For both labor and equipment reasonably efficient use would not mean the highest possible output per unit of input. It would mean rather that both family labor and equipment were utilized to the point at which marginal productivity was sufficiently low that under average conditions there would not be a tendency to increase the volume of business.

[21] Ga. Expt. Sta. Bul. 221. Experiment, Ga. Oct. 1942, p. 28.

Since the definition provides for efficient use of family labor over the life cycle of the family, a farm, so defined, would have to be large enough to avoid the uneconomic use of family labor during the period when the effective family labor force was large. Since it does not specify a fixed labor force, volume of business might be varied considerably over the years. Thus, depending on the type of farming, a family size farm might be operated as a 1-man enterprise at some times and as a 2-man farm at others.

Keeping in mind the goals of family farming, a serviceable definition of the *socially desirable family-size farm* might be somewhat as follows: "The desirable size of farm for the family of average managerial ability would be a farm that would permit the reasonably efficient use of labor-saving equipment and of the family labor force over the life cycle of the family and provide with average management a labor and management return adequate to maintain a socially acceptable level of living."

Specifying the minimum income in terms of a labor and management return would permit one income standard to be used regardless of tenure and debt status.

This definition differs from the preceding one only in the additional requirement that the farm provide a socially acceptable living. In practice, a compromise would often have to be made between efficient use of labor and equipment and adequate income.

By relating desirable size of farm to a technical unit of organization it should be possible to determine a size of farm that with average management would not be under constant pressure to be made larger because it did not provide enough work for the labor force or equipment, or smaller because it required too much. It is true that technological changes would call for adjustments in the acreage, and organization of a farm so defined, but these adjustments would also have to be made on farms defined in other ways.

The first of the three definitions given here describes the whole array of family farms. The others refer to only two of the many special kinds that might be described. Other kinds would include, among others, the "subsistence farm" and the "minimum adequate income farm." Some of these may be just as socially desirable as the family size farm for some families. It must not be overlooked that there is a place in American agriculture for a wide variety of farm sizes to match the wide variation in managerial skill, available family labor, and personal inclinations of farm operators.

IMPACT OF TECHNOLOGY ON SOUTHERN AGRICULTURE

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TECHNOLOGICAL processes and devices are beginning to affect Southern agriculture.[1] What the final outcome will be is not clear. It is possible that Southern farming is undergoing a radical transformation, the final results of which may be far-reaching. The "Old South" with its rigid social stratification, race prejudices, low income, and other defects may, under the impact of technology, completely disappear. Although such a revolution may be too much to expect of any force, technology or otherwise, the South is changing, and it is this subject of change to which I wish to direct your attention.[2]

Within the scope of this discussion are included all phases of technology as they impinge on farming. Some of these are quite obvious, such as those stemming from or associated with the wider use of mechanical power, the development and use of plant and animal hybrids, new and more effective sprays designed to control animal and plant pests and diseases, and boron and copper applied to the production of crops. There are other technical processes, the effect of which is perhaps less obvious and more subtle. The use of electricity, not only for power on the farm but for the farm home, is having a marked effect on the thought processes and habits of Southerners. The substitution of tractors for mule power is causing a change in the relation between the farm laborer, cropper, and the landlord. It will not be possible to trace the exact result of all of these things on the agriculture of the South. Attention will be centered on only those technologies which are of greatest immediate significance.

I

A logical treatment of this subject requires first a brief characterization of Southern agriculture. It is an economy built around the production of cotton, tobacco, peanuts, fruits and vegetables,

[1] The South as visualized in this discussion includes the following states: Alabama, Arkansas, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia.

[2] The ideas expressed in this article are the author's and not those of the North Carolina Experiment Station.

and small grains. This would appear to be a diversified agriculture, but the fact is that most types of farming areas are highly specialized. Livestock production, except in specific areas, is not an important feature of Southern farming.[3]

The economy is also characterized by low wages and low per capita returns to farm operators.[4] These low incomes affect the standard of living, which is probably the lowest in the nation.

A distinctive characteristic of Southern Economy including agriculture is the division of the population into three groups—Negroes, poor whites, and a dominant white class. This horizontal division of the economy has far-reaching effects and implications. It may determine the extent to which Southern farming may be modified by the introduction of technologies. This characteristic, as I have observed it, tends to prevent the Southerner from considering any problem and its solution objectively. It is not the fact that a critical problem exists which is of major importance, but how its solution will affect the social stratification of Southern society. If perchance the solution of any problem, even a minor one, means that this stratification will be altered, then the Southerner will readily resign himself to the problem since the cure, in his opinion, is worse than the disease. And since most technologies do affect the social stratification, the South may face a difficult task in adopting technological devices and processes and in retaining, at the same time, these social distinctions.[5]

Another distinctive feature of Southern farming is worth mentioning. In the past the Southern farm operator has refused to accept in full his managerial responsibilities. In the main he has been content to let labor, and badly qualified labor at that, assume the management of the farm. This attitude, in part, is the result of his heritage and, in part, is the result of the great abundance of relatively cheap labor. But whatever the cause, he dislikes to assume the role of management, certainly in any effective manner. When asked why he does not organize and operate his farm in a more effective manner or adopt approved practices, his usual answer is that the labor available is so "sorry" that it is impossible to do

[3] With the possible exception of butter all livestock products are increasing in importance and in some areas the income from livestock exceeds that received from crops.

[4] *Income Parity for Agriculture*, Part VI, U.S.D.A., B.A.E., October, 1945.

[5] If the impact of technology becomes so overwhelming as it did in the Industrial Revolution, then this social stratification would disappear or become greatly modified.

anything with it. "You can't train a 'Nigger' " is the reply when you suggest that perhaps the labor could be taught to do things in a different and better way. Yet the same labor can be trained to do effective work in other industries, professions, and personal services.

This refusal to accept managerial responsibility is also demonstrated in the usual treatment accorded laborers, croppers, and tenants. These are usually poorly housed. Even the most obvious improvements are neglected. The idea that possibly better treatment of the labor force would lead to more efficient production has never occurred to thousands of farm operators in the South. And yet, where considerate and farsighted landlords have accepted full responsibility for the management of their farms and have established reasonable landlord-tenant relations, the results, both as to productivity and income, have been highly satisfactory.

II

Any impact of technology on farming, if it is significant, ought to result in change. It will be essential, therefore, to study the changes which have occurred in Southern agriculture in recent years. For this purpose, the period from 1930 to 1945 will be used. True, changes prior to this period may be and undoubtedly were important, but changes since 1930 are more apt to be the result of technology than those which took place at an earlier date.

The first change which is of peculiar interest is the change in type of power used on Southern farms. The number of horses and mules on Southern farms in 1930 was 6,053,914 as compared to 4,220,210 in 1945, or a decline of 30 percent. On the other hand, the number of tractors increased from 121,596 to 430,834 during the same period, or an increase of 254 percent.

What has been the effect of the change in the type of power and equipment? Although cotton and tobacco are still the dominant crops, they are not so important as they were a decade or more ago. In 1930 these two crops occupied about 44 percent of the cropland, whereas today it is probably less than 25 percent. It cannot be said, however, that this change is the result of mechanization. Both crops, although mechanized to some extent, have resisted complete mechanization. This is true certainly of tobacco and for cotton except where the mechanical picker has been used. The reduction in the acreage of these two crops, therefore, must be the result, in part at least, of other causes, such as low prices and governmental control programs.

The acreage of small grains, where the tractor and power-driven equipment might be expected to have their greatest effect, has increased from 8.3 percent of the total acreage to 13.9 percent. This is an appreciable increase but of no great significance since small grains are relatively unimportant in the South. There has been a slight increase in the acreage planted to corn.

The average farm in most Southern states has increased in size. The increase has not been uniform. In some states such as North Carolina, Tennessee, and Louisiana the change in size has not been significant. For other states the change has ranged from 17 percent in Oklahoma to 31 percent in Texas.[6]

It has been said that mechanization will have a marked effect on the number of people on farms. This is undoubtedly correct, especially if the dominant crops such as cotton and tobacco can be completely mechanized. To date, changes in farm population have not been significant. Between 1930 and 1940 the farm population in six of the Southern states actually increased, in one it remained constant, and in four it decreased. It may be significant that the greatest reduction occurred in Texas and Oklahoma where perhaps mechanization of the dominant crops has been more pronounced. It must be said, however, that during the War period farm population in most states declined rapidly. Whether or not this is a permanent decline cannot at this time be predicted with any degree of accuracy.

III

This over-all picture is illusive. It is difficult to attribute the changes which have taken place in Southern agriculture solely to technology. For this reason, it will be necessary to examine data derived from specific studies. Although studies in this field are limited, there are a few which reflect the effect of the use of tractor on farming. Barlow and James made a study of this subject in the Northern Coastal Plains Area of North Carolina.[7] These investigators found that mechanization did affect the organization of the farms. The changes, however, were by no means revolutionary. To quote from this report:

"The highly mechanized farms had approximately 58 percent of the crop acreage in row crops, 28 percent in small grains, hay, and soybeans,

[6] The changes in size are probably greater than the census data indicate since the census definition of a farm is defective.

[7] Frank D. Barlow, Jr., and H. Brooks James. "Mechanization in Relation to the Organization of Farms." Processed. Raleigh, N. C. August, 1944.

and the remaining 14 percent in cover crops. The distribution of crop acreage in Halifax County on all farms was 78 percent in row crops, 12 percent in small grains, hay, and soybeans, and 10 per cent in cover crops. For the Northern Coastal Plains Area approximately 75 percent of the total acres was in row crops, 14 percent in small grains, hay and soybeans, and 11 percent in cover crops."

These results were found to hold true for the Central Piedmont of North Carolina in a study by Greene, James, and Dawson.[8]

"Farmers using workstock for power devoted a larger proportion of their cropland to row crops and a smaller proportion to small grains and lespedeza than did farmers using tractors. On the latter group of farms, 21 percent of the cropland was in corn, 46 percent in small grains, and 36 percent in lespedeza harvested for seed, in contrast to 28 percent in corn, 36 percent in small grians, and 22 percent in lespedeza for seed on farms using horses as a source of power."

The information now available indicates, therefore, that while minor changes have been made and others are likely to occur in the organization of Southern farms, there is little or no evidence that these changes, except perhaps in specific areas, are or will be of a revolutionary nature. The tendency to grow more acres of small grains is not, in itself, sufficient evidence that these crops will be a major factor in bringing about fundamental changes in Southern farming. Production in the great grain producing areas of the nation has been completely mechanized and the production from these areas should hold in check any tendency for the South to enter small grains production on a major scale. That this may be true is indicated by the fact that the acreage in small grains has tended to decline since 1910 although the value of these products when expressed at constant prices has increased.

It is quite possible that mechanization may effect changes other than those associated with the organization of the farm. If all of the farm operations could be completely mechanized, then farm products could be produced more efficiently. This possibility has led to the belief that both wages of farm laborers and profits to the operator would rise. Although this thesis would require considerable discussion, it can be said, somewhat dogmatically, that any change from partial to complete mechanization would not, ipso facto, increase wages and profits. Whether or not wages would be changed would depend on the alternative opportunities for farm

[8] R. E. L. Greene, H. Brooks James, and C. G. Dawson. "Cost and Utilization of Power and Equipment on Farms in the Central Piedmont." Processed. Raleigh, N. C. September, 1946.

labor. Certainly any sudden shift to complete mechanization would mean a surplus labor supply and lower wages. Nor is it at all clear that profits of the operators would be enhanced, since there is a tendency for prices to follow costs. The lower cost resulting from complete mechanization would tend (other things remaining the same) to expand cotton production and to lower prices until a new price-cost equilibrium was established.

These limits to complete mechanization have been recognized by competent authorities. On this subject Welch and Miley[9] express themselves as follows:

"The assumption that widespread shift to mechanical production of cotton will automatically solve the income problem of cotton producers seems to be rather widely accepted. Such assumption needs critical examination.

"As a result of the existence of a large number of independent production units and intense competition, most of the gains in more efficient production in agriculture are, sooner or later, passed on to the consumer. Furthermore, the gains that do accrue to the producer are usually capitalized into increased land values. If improvements were adopted by producers simultaneously, consumers would undoubtedly get most of the benefits of increased efficiency quickly, but one of the most significant impacts of technological advancement in agriculture, however, is that farmers do not and cannot apply at equal rates the results of science and invention. New and old techniques continue side by side—the one-horse plow and the tractor operate in adjacent fields; one-horse wagons and modern trucks transport cotton to the same market; and very likely, the power harvester and the laborer armed only with his bare hands and a sack across his back will both continue to harvest the American cotton crop for some time to come.

"As result of uneven adoption of new machinery, scientific knowledge, and new techniques, farmers who first adopt these undoubtedly gain while others are following at an uneven pace. As more and more farmers follow in more efficient production, there is always a tendency for prices to fall or other adjustments to be made that tend to reduce or eliminate the direct economic gain to the producers. Furthermore, there is usually a significant number of farmers who, for one reason or another, cannot take advantage of the new efficient techniques, and consequently, their already low standard of living may be still further reduced as price is reduced or as they are forced to make farm adjustments that bring lower returns than did the old system under the old price level. In the long run of course, it must be assumed that those not needed on the farms as a result of production efficiencies will find alternative employment either on or off the farm."

The extent to which a surplus farm labor would be created by mechanization is not known at present. However, some estimates

[9] Frank J. Welch and D. Gray Miley. *Mechanization of the Cotton Harvest.* Mississippi Experiment Station *Bulletin* 420, June, 1945, p. 20.

have been made by the Southwide Cotton Committee.[10] Keeping in mind that there are already seasonal surpluses of labor on most Southern farms, the Committee estimated that under partial mechanization (to the extent profitable) the existing (1943) labor requirements could be reduced about 20 percent for the Cotton Belt as a whole. For some areas, or under exceptionally favorable conditions, the labor required might be reduced by as much as 50 percent.

Estimates of this sort can be substantiated only in part from available research studies. Welch and Miley, although not presenting their results in physical units, indicate a marked decrease in the labor required in harvesting cotton by mechanized picking as compared to picking by hand.[11] Barlow and James[12] found that it required 134.5 hours per acre to perform all of the operations in the production of one acre of cotton under non-mechanized conditions,[13] as compared to 107.9 hours when all operations with the exception of picking were mechanized. Thus partial mechanization reduced the labor requirements about 20 percent.

From these data can be derived an estimate of the labor requirements under complete mechanization. Assuming that it takes about 8 hours to harvest an acre of cotton by using a mechanical picker,[14] then the labor requirements per acre under complete mechanization would be 33.8 hours or a reduction of 75 percent.

It would be possible to present similar data showing substantial reductions in the labor requirements of other crops such as peanuts, soybeans, corn, and small grains as a result of mechanization. It would appear, therefore, that, where cotton is the principal crop, mechanization is in the process of adding substantially to the surplus labor on Southern farms. However, since there is little evidence that tobacco production will be completely mechanized a part of this surplus labor will be needed to harvest this crop. This in itself may check the rate of mechanization especially on those farms growing both cotton and tobacco. That is, farmers growing both crops will face the problem of using a mechanical picker, and thus

[10] See *Production Adjustments to Improve Farming Conditions in the South.* Processed. Raleigh, July 1946.

[11] *Mechanization of Cotton Harvest*, p. 18.

[12] *Farm Mechanization*, N. C. Exp. Sta. *Bulletin* 348, December, 1944.

[13] These data should not be considered as absolutely correct since most farms used some mechanical equipment.

[14] Information obtained from unpublished data by Alabama, Mississippi, and Louisiana Experiment Stations.

reduce the labor load, or picking the cotton by hand and thus have the labor available on the farm to harvest tobacco.

IV

Technological processes and techniques, other than those associated with mechanization, are also affecting farming. Among the most important of these is the increasing use of hybrid corn, of new sprays to combat plant and animal pests and diseases, of new drugs which affect the rate of animal metabolism, and of more lime and phosphates on crops and pastures. All of these undoubtedly will have a marked influence on Southern farming. Lest our enthusiasm, however, should get out of control, it is necessary to remark that these technologies, as those associated with mechanization, are not monopolies of Southern farmers. They are or can be applied elsewhere in the nation, and their use has the tendency to effect vertical rather than horizontal changes. If this should prove to be the case, the general pattern of the nation's agriculture would remain virtually the same. To be sure, efficiency in production would increase, but the comparative advantage of farm enterprise might not be greatly modified.

It may be worth while to explore this concept as it applies to certain technological improvements which have already been mentioned. Hybrid corn is perhaps the best example. It has been demonstrated that by the use of hybrids, corn yields may be increased by as much as 25 percent. These hybrids when accompanied by the "proper" use of specific fertilizers may produce yields in excess of 100 bushels per acre.[15] The possibility of thus increasing the yields of corn has led to the optimistic view that livestock production can be greatly increased in the South. This deduction is at best only partially valid. When it is considered that the South is not a closed economy but is an integral part of the agricultural economy of the nation, there is no doubt that the price of corn and the price of animals and animal products in the "free" market of the nation will be influenced not only by corn grown in the South but also by corn produced in other parts of the country. If this be true, then the South will not have any distinct advantage in the production of corn over other sections in the United States, and hence the present

[15] "Research and Farming." Sixty-Seventh *Annual Report* of the North Carolina Agricultural Experiment Station, 1944.

status of corn and livestock production should, generally speaking, remain in effect.

The changes which may occur in Southern agriculture, as a result of increasing the yield of corn, will depend, as always, upon the profitableness of competing crops. It is well known that corn in most, if indeed not all, sections of the South is a crop which must compete with cotton, tobacco, peanuts, soybeans, and small grains for a place in the scheme of farming. To the extent that the comparative advantage of corn, through the use of hybrids and proper fertilization, can be increased, its position is improved. But it is difficult, at least at this time, to believe that technological devices used in the production of corn will be so overwhelming as to effect any marked change in its comparative advantage. If this be correct then corn will not be produced in sufficiently large quantities to provide the basis for a marked increase in livestock production.

There is, however, some evidence that small grains together with an increase in the quality and acreage of pastures may assist in livestock production. It is perhaps too early to determine the extent to which idle land can be converted into pastures or that small grain production can be increased. The cost of obtaining pastures has been high. In recent years, however, pastures have been improved by new technologies especially by the use of lime and phosphate and other fertilizers. The cost is less than previously thought possible. For example, for various areas in North Carolina it has been estimated that the annual cost of permanent pasture is approximately $8.05 per acre. Since it will take at least two acres of permanent pasture with one-half acre of temporary pasture to maintain one unit of livestock, the total cost per animal unit per year will be about $20.88.[16]

An observation should be made here about the prospects of alfalfa as a forage crop. Experimental work now under way indicates that this crop may become a factor in determining the place of livestock in Southern agriculture[17]. In the past this crop, when tried, has been a failure; but, because of use of minor elements, especially boron, it is now possible to obtain excellent yields. The results from experimental work, however, are not sufficient to permit any state-

[16] It should be noted that it requires about five acres of unimproved pasture to maintain one unit of livestock under normal conditions.

[17] *The Place of Livestock, Forage Crops, and Permanent Pasture in Farm Organization. Mimeograph report,* N. C. Experiment Station.

ment as to the ultimate role which this crop may play in Southern farming.

Some mention must be made of the probable effect on livestock production of new controls of animal pests and diseases.[18] These are of special interest to the South since the climatic conditions are especially favorable to animal diseases, pests, and parasites. The new controls undoubtedly are and will be effective; and, to the extent that this is true, the comparative advantage of livestock production will be enhanced. Again, as with other technological developments, it is too soon to determine, with any accuracy, what the final effect of these new controls will be.

V

There are a number of conclusions which may be drawn from this discussion. Assuming that the data presented are valid, it is clear that Southern farming is being subjected to technological devices and processes. It is equally clear that certain changes in the organization of farms, in the size of farms, and in the efficiency with which certain operations are being performed are underway in the South. Changes which have occurred, however, do not appear to be of a revolutionary character. In no sense can it be said that systems of farming, except perhaps in rare instances, have been radically altered. There is evidence, as indicated by increases in the size of the farm, that the magnitude of the farm business has been augmented. This change, however, except perhaps in a few areas has not been startling. A much greater potential change is possible in the efficiency with which certain farm operations may be performed. This is especially true for those products the operation of which can be completely mechanized. However, with the exception of cotton, rice, peanuts, soybeans, and small grains, no great change in efficiency because of mechanization can be expected in the immediate future. The operations of some of the major crops, notably tobacco which requires a large outlay of labor, are not completely mechanized.[19] And at this time there is no evidence that they will be mechanized.

These processes and devices which are somewhat more indirect in their effect are especially difficult to appraise. The use of hybrids, new sprays, drugs, and new farm practices unquestionably are af-

[18] DDT and Phenothiazine.

[19] Also true of fruits, vegetables, and peanuts.

fecting the agriculture of the South. There is no evidence, however, that any one of these or all combined will bring about anything more than an absolute improvement in Southern farming. The chief reason why this is apt to be true is that all of these devices and processes are available to all farmers of the nation. In order for them to affect Southern farming, they would have to provide some economic advantage to the South alone.

There is no evidence that the impact of technology will greatly modify the population stratification of the rural South. That it will have some effect can be granted, but that it will dissolve this situation is not to be expected. And it may be said that until a solution of this problem can be found, Southern agriculture will be subjected to one of its greatest disadvantages. Nowhere else in our agricultural economy does such a major stratification exist. The result is that farmers elsewhere, whatever other handicaps may be their lot, are not subjected to those disadvantages which emerge from race conflicts.

There is evidence that technology will have some, and perhaps a deciding, effect on management. With the increase in the use of the tractor and tractor equipment and other technological devices and processes it seems impossible for management any longer to refuse to accept its full responsibility. If management hesitates or refuses to do so, then there may be set in motion a profound change in Southern farming in which the present owners will be forced out of agriculture and be replaced with alert and progressive entrepreneurs. This change is being made in industry and it may happen in farming. The process, however, will be slow and attended with great exploitation of the soil and human labor.

The general conclusion which may be drawn from this discussion is that by use of technological devices and processes, the agriculture of the South may be able, through more efficient production, to improve markedly its economic position. This improvement, however, will not be sufficient to change its relative position in our agricultural economy as a whole. There is nothing in the facts, nor can any deduction be made from an analysis of the existing data, to warrant the conclusion that the South's income position will be advanced as compared to other segments of our agricultural economy.[20] Technology of itself is not the solution for the ills which beset Southern agriculture.

[20] Although the absolute income has changed markedly, the relative income position of the Southern states has not changed appreciably for the past 25 years.

THE MASTER SAMPLE PROJECT AND ITS USE IN AGRICULTURAL ECONOMICS*

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THE word *survey* is based upon the two root words meaning *over* and *see* (according to our dictionaries), and is defined as the act of examining closely, or of determining the features of, as of land. Probably the best known examples of surveys are the federal censuses of population and agriculture. These provide detailed information for the social and political sciences in much the same manner that public land surveys, geological surveys and soils surveys serve the physical sciences.

The use of surveys, however, is not confined to the purely descriptive purposes which, for example, the censuses primarily serve. Indeed many studies of *processes*, such as the detection and measurement of cause and effect, have used the survey method as contrasted with the experimental method frequently employed in the biological and physical sciences. Because it is beyond the scope of this paper to consider the appropriateness of the different methods of study, it will suffice to state here that in agricultural economics the survey method is an old and well-established means of investigation, especially for descriptive purposes.

It is well known that the survey method has been criticized. The most relevant of the criticisms are:

(1) surveys are costly;
(2) the basic data are inaccurate;
(3) the "representativeness" of surveys, based on samples, is questionable.

On the first point it may be said that if surveys are unnecessarily costly, it is not because they are *surveys* but because they are *poorly designed surveys*. During the past decade considerable progress has been made toward better use of survey resources by the adoption of appropriate sampling and other statistical procedures. By proper design many surveys can be made to give the desired information at far less cost than that of other methods.

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As to inaccuracies, there is sufficient evidence available to show that most data obtained by interview contain them. They occur because of poorly constructed questionnaires, unskilled interviewers, and, in agriculture, the farmer's faulty present as well as past knowledge of the details of his farm and its operation. Some progress has been made in detecting the nature and magnitude of these inaccuracies, and some measures to control them have been put forth. Overall survey accuracy can frequently be substantially increased by employing a good sampling design. By confining the survey to a relatively small sample, it is possible to select and train investigators more adequately, and to deal with other sources of error more effectively. It will often be found that the errors which have been introduced by sampling will be more than offset by the consequent reduction of non-sampling errors.

Except for the censuses, most agricultural surveys are samples of some sort. The sample feature may be explicit or implicit. It is explicit when the reader or user of the survey results is told that only a fraction of all farms in the area of inquiry were dealt with. Example: "A sample of 800 farms was selected to represent all farms in the state." It is implicit when the reader is given a statement like this: "although the survey was confined to Smith County it seems reasonable to conclude that similar results would be found in the whole southeastern area of the state." In this case Smith County, in a sense, is a sample of the "southeastern area of the state." In both of these cases, the survey was used to represent something larger or more general than the surveyed portion.

On the problem of making surveys "representative," or more accurately, of dealing with the sampling problem of surveys, much progress has been made during the past decade. A method of sampling known roughly as the "area method" has proved useful in a number of different kinds of inquiries and under a variety of conditions. This method, although not new in principle, is new in its applicability. Its use is being extended rapidly not only in this country but in other countries as well.

The area method of sampling has two features that help distinguish it from other methods: (i) the unit of sampling is a small area and (ii) each element in the universe under study is given a known probability (greater than zero) of being selected.

Using areas as sampling units is a means for providing each farm, or whatever is being measured or observed, a known probability of

selection in the sample. This provision is made in a very simple manner. Let us consider as an example a universe that involves all the farms in a state. We should like to have a sample of those farms which is reasonably representative of the state. From previous experience, and from consideration of the particular needs of the proposed sample design, it is decided that a sample of about 1000 farms will be needed. If a list of all farms in the state were available it would be a simple matter to draw the sample. But accurate lists of farms are rarely compiled; and if they are, it is usually found that the unit of compilation is inappropriate for the study at hand, or that the list is out-of-date. The universe of farms in a state, therefore, is never really known precisely and is constantly changing through time. On the other hand, since every state is adequately mapped, the area of a state can be determined accurately and doesn't change through time. By regarding the state's total area as comprising relatively small component parts (such as road-bound areas) then a universe of areas is created which (i) has a known number of area parts or segments and (ii) does not change through time. The universe of farms is related to the universe of areas by the fact that all farms must be located in some manner in the areas. The two universes are brought together for sampling purposes by a "rule of association." For example, all those farms are "associated" with a given area whose "headquarters" are located within its boundaries. Other rules can be used, but it is usually a desirable condition that each farm be associated with one and only one area regardless of its size, shape or other characteristics. If this sort of rule of association is followed, then the probabilities of sample selection that are assigned to the areas will also hold true for the associated farms. For example, if areas are selected with equal probability then farms are selected with equal probability. In fact, this is how farms are selected by the area method.

Let us suppose in our example that we have partitioned the state into 25,000 small areas or segments. Let us also suppose that we know that the total of farms in the state is approximately 100,000. A 1,000-farm sample then will include about 1/100th of the farms. If we select 1/100th of the 25,000 areas we shall obtain 250 areas with about 1,000 associated farms, that is, we "expect" to get 1,000 farms in our sample. Of course for any one sample it will be found that we may depart somewhat from the "expected" number. This is due to (i) sampling fluctuation and (ii) inaccuracy of our knowl-

edge of the total number of farms in the state. Actually the total number of farms can be estimated from the sample by multiplying the number of farms found in the sample by 100.

It may be seen from the example given above that in order to employ the area method of sampling some work is required in setting up the universe of areas. An idea of the work required will be given in the following brief description of the largest area sample of farms drawn up to the present time. This sample is known as the Master Sample of Agriculture; it was an integral part of the 1945 Census of Agriculture.

In this sample, the field under inquiry was the whole continental United States. It was partitioned into approximately 1,200,000 areas or segments averaging about 2.5 square miles in size, of which 1/18th, or 67,000, were designated as the Master Sample of Agriculture. These 67,000 segments located in every county of the U. S., contained the headquarters of approximately 300,000 farms. Any change in total number of farms since 1940 will be reflected by the sample within limits of accuracy which can be measured.

There are three features of the design of the Master Sample of Agriculture which will be appropriate to mention here. First the principle of sampling farms by sampling areal segments, discussed above. The second principle is that the size of the sampling unit should be as small as practicable. It is convenient to use as a measure of the size of an areal segment the number of farms whose headquarters are located within its boundaries. The average size of the units used in the Master Sample of Agriculture was 5 farms (1940 census basis): in Indiana the areal extent of these units averaged 0.71 square mile, in Nevada, 108 square miles and in the whole United States 2.5 square miles. In order to bring about some control of the size of individual segments, maps of counties were obtained which showed locations of dwellings in the rural areas and in many cases indicated whether such dwellings were farm or nonfarm. By the help of the maps it was possible to construct segments having approximately the desired number of farms on each. This was one of the most important and costly operations of the project, and was justified on the ground that the more efficient sampling it made possible was worth the cost.

The third principle was geographic stratification. Distributing the sample as widely as possible seems to be particularly appropriate when (i) the sample is to serve a multitude of purposes, (ii) the advantages, if any, of alternative schemes have not been shown,

and (iii) the time schedule does not permit the construction and testing of more elaborate alternative schemes. Because all three of these situations existed, geographic stratification was adopted for the Master Sample of Agriculture. If time had permitted, it is likely that other schemes could have been found which would have been more suitable for some of the counties.

Although it is beyond the scope of this paper to discuss the details of the sampling procedure followed in preparing this sample, it may be of interest to describe briefly the general plan and some of the steps taken to carry it out.[1]

In a sense the Master Sample of Agriculture consists of a collection of 3070 samples, that is, samples of each of the 3070 counties of the continental United States. The same sampling procedure was followed in each county. On highway and transportation maps of each county, obtained from the State highway departments, three zones were demarcated. In zone one were included all incorporated towns and cities regardless of size. The corporate limits of these places constituted the zone boundary. Zone two comprised all unincorporated villages and towns, and all populated areas appearing to have a population density of 100 inhabitants or more per square mile. Inasmuch as these places do not have legal or otherwise defined boundaries, it was necessary to establish outlines which would make the places definite territories on the maps. Boundaries for all such places were drawn on the maps in such a manner that (i) the densely populated areas were segregated as sharply as possible from the more open and sparsely populated surrounding country while (ii) making the boundaries identifiable by investigators in the field. Zone three consisted of the remaining portion of the county, this included most of the farming, forest, waste and other land. All territory regardless of use, whether populated or not, was classified into one of the three zones: (i) incorporated places, (ii) unincorporated places and (iii) open country.

The next operation consisted of partitioning the several zones into small areas. In the open country zone each area contained about 5 farms and not more than 10 families (farm and non-farm); in the zones of incorporated and unincorporated places there was no attempt to control the number of families, although each area was made so that it would include about 5 farms.

The areas into which the open country zone was partitioned serve

[1] For more detail see R. J. Jessen, "The master sample of agriculture: Part II. Design." *Journal Amer. Stat. Assn.* 40: 46–56 (1945).

as units for sampling either or both farms and persons, whether farm or non-farm. This portion of the sample is as useful, therefore, for a sample census of population as for a sample census of farms. This dual-purpose sampling unit is feasible only in the open country where the majority of the families are engaged in farming.

Table 1 presents some characteristics of the three zones for the United States.

TABLE 1. PERCENTAGE OF LAND AREA, FARMS, AND TOTAL POPULATION IN THE UNITED STATES IN THREE ZONES OF THE MASTER SAMPLE OF AGRICULTURE

Master sample zone	Land area (estimated)	Segments (sample areas) (actual)	Farms* (estimated)	Population* (estimated)
	(%)	(%)	(%)	(%)
Incorporated places	1.0	3.4	3.4	63.6
Unincorporated places	3.0	6.4	5.9	10.5
Open country	96.0	90.2	90.7	25.9
Total	100.0	100.0	100.0	100.0

* Based on the Censuses of 1940.

Each of the selected areas was delineated on a map to show clearly its exact position and extent. In order to aid the investigator in identifying the sample area boundaries, aerial photographs were obtained, wherever available; these were usually 3 inches to the mile in scale and showed identifying boundaries in considerable detail. The enumerator for the 1945 Agricultural Census was required to fill out a special supplemental questionnaire for all farms whose headquarters were found to be located within the sample areas.

The earlier ideas of a "Master Sample" envisaged a national cross-sectional sample of about 5,000 farms on which certain basic agricultural and other data would be obtained. For special studies, requiring additional kinds of data, field surveys would be made on subsamples of this sample. In studying relationships, efficient use could be made of these data by combining the special with appropriate basic information; and in some cases, by drawing upon information which may have been obtained on the 5,000 Master Sample farms of previous special inquiries. The Master Sample, therefore, was a scheme to (i) improve the representativeness of farm sample data, and (ii) assist in the integration of the collection and use of

these data when desired for more effective utilization in broad research problems. For example, much of the basic data for several research studies could be obtained on a single integrated survey. Special inquiries could be made on certain farms drawn from the basic set by utilizing information on the whole "Master Sample."

When this scheme was discussed with interested persons in the BAE, their demands and ideas were so great and varied that it became necessary to increase the size of the proposed sample to 300,000 farms. Also, the scope was expanded from a sample adequate to provide for the needs of small integrated research investigations to one competent for a full-sized sample census of agriculture. When the master sample idea reached this scale, the Bureau of the Census became interested, because it was making plans for the 1945 Census of Agriculture, and because it too had designs for sample censuses of both agriculture and population.

The two government bureaus and the Statistical Laboratory of Iowa State College joined forces and set November 1, 1944, as the date by which the maps and aerial photographs showing the selected areas were to be completed for use in the 1945 Census of Agriculture. The basic work of zoning the maps, partitioning the counties into the 1,200,000 areas, delineation of the 67,000 selected sample areas on maps and aerial photographs was done in Ames. The integration of these materials into the regular census operations was done in Washington by the Bureau of the Census. When census returns are tabulated and published, they will include estimates based on the Master Sample of Agriculture. The estimates will be for those items carried only on the supplemental questionnaire and asked of only those farms in the sample (and certain "large farms").[2]

Another use of this sample has been made recently by the BAE in its new sample survey of farms begun in January, 1947 and planned to be repeated quarterly. This survey will provide national and some state estimates of a number of agricultural items including number of farms. During 1945–46 the BAE experimented with a smaller survey known as the Quarterly Survey of Agriculture which was the forerunner of the present larger one. The Master Sample of Agriculture was also an integral part of a sample census

[2] In order to keep sampling variation to a minimum, the "large" farms were sampled completely, that is, a supplemental questionnaire was obtained from all such farms whether they were associated with master sample areas or not. Special rules were set up for defining and identifying farms which were to be regarded as "large."

of population, the preparation of which was authorized by Congress but for which field funds have not as yet been granted.

For general use, the Master Sample of Agriculture is somewhat limited. The bureaus of the Census and Agricultural Economics would like to guard against its overuse by controlling the kind and frequency of inquiries permitted on its sample areas. Moreover they wish to reserve these areas so far as is practicable for visits by their own interviewers. Many inquiries, therefore, will have to be taken on the 1,133,000 sample areas not in the Master Sample of Agriculture. Fortunately, when the Master Sample of Agriculture was being designed and prepared, considerable attention was given the problem of selecting subsequent area samples quickly and at low cost. Since the beginning of the project the basic county maps have been in almost constant use for drawing new samples. Many of these purposely avoided the master sample areas. These samples have been prepared not only for the BAE and the Bureau of the Census but also for other government agencies, as well as for colleges and individuals. Most of these have been for local surveys but some have been nation-wide. None have included all counties as did the Master Sample of Agriculture. Some were concerned with cross sections of the population rather than with farms alone. Still others were limited to special types of farms. Of course the sampling rates of these samples were different from the 1/18th used in the Master Sample. Despite this wide variety in type of inquiry and need for varying the design of the sample to fit the survey problem at hand, the master sample materials have proved to be adequate.

The kind of sample that may be provided for a number of statewide surveys may be illustrated by this example. In the summer of 1945 it was believed advisable to prepare for Iowa a sample which could be used for surveys of families and farms in the state. It was to serve as a general purpose sample—one that could be used for a number of different kinds of inquiries including research investigations requiring cross-sections of Iowa's families, farms, consumers, etc. By preparing the sample far in advance of its use, it was possible to achieve the rather substantial gains in efficiency that come from careful and thorough planning—something which is difficult to obtain in hurried sampling designs.

Considering the various aspects of the problem—such as the kinds of variation existing in the state, the cost of carrying out the field work, the amount of sampling variation which could be toler-

ated, etc.—a sample consisting of 635 families including about 225 farms was regarded as adequate as a base. This was obtained by the plan summarized in Table 2.

TABLE 2. SUMMARY PLAN OF A GENERAL-PURPOSE SAMPLE OF IOWA

Zone	Total of number of		Number in sample		Sampling rate	No. of segments (single sample areas) in sample	No. of families in sample
	Counties	Places	Counties	Places			
Open country	99	—	20	—	1/1,000	53	236
Rural places (all unincorporated villages and all incorporated places under 2,500 population)	99	1,031	20	34	1/1,000	26	129
Urban places (all incorporated places 2,500 and over in population)	—	99	—	17	1/1,000	54	270
Total	—	—	—	—	—	133	635

Maps and aerial photographs covering every sample segment were obtained and on these the sample segments were delineated to show the investigators precisely where interviewing was to be done. The procurement of these materials usually requires several months —one reason why it is advisable to begin the preparation of samples of this sort well in advance of actual use. The maps and photographs were cut and fitted so that they could be assembled in a standard size kit for field use.

This General-Purpose sample for Iowa has been used for several inquiries since its completion and it appears its usefulness will continue. During the summer of 1946 the sample was utilized for a survey of food preferences. This study was concerned with the respondents preferences on kinds of food, methods of preparation, menus, etc. Respondents consisted of young people who were 17, 18 and 19 years old and men and women 48 to 56 years of age. Because this inquiry was confined to persons of certain age groups, it was advisable to modify the original sample somewhat to make it more efficient for this particular job. This was accomplished by merely

enlarging the size of the sample segment to 3 times its original size (about 5 families) to about 15 families, an operation easily performed on the original set of materials. All families living within the enlarged sample segment were visited. The interviewers determined the age and sex of each member in order to learn where interviews were to be made.

The General-Purpose sample of Iowa was also used for a survey of Iowa farms to obtain information on the morbidity and mortality of farm animals. This study was begun in April, 1946. Each month the survey is made in a different set of five counties, resulting in quarterly visits to each farm—inasmuch as there are 4 sets of 5 counties in the entire sample. By carrying out the field work on this time schedule, it permits of cross-sectional samples of the state each month without undue interview burden on the sample farms. This inquiry was confined to the open-country part of the sample. The 53 open country segments are shown in Table 2. They contain about 236 households of which approximately 225 are farms.)

The General-Purpose sample of Iowa has already proved to be a useful device for specifying where surveys of cross-sections of Iowa can be made efficiently. It is expected that it will continue to be a useful device for carrying out many future investigations. These may include studies of consumer preferences and other marketing problems with which the Agricultural Research and Marketing Act of 1946 is concerned. In anticipation of these and other uses, a similar type of sample for nation-wide studies has been prepared for the United States.

The design and preparation of such samples as described above is certainly not limited to those having direct access to the Master Sample materials. Having access, however, greatly simplifies the task and reduces the cost. For those who are interested, the three agencies controlling the Master Sample materials, the Bureau of the Census, Bureau of Agricultural Economics, and Statistical Laboratory of Iowa State College, will give advice and help on sampling design problems and will assist in the preparation of specified samples at cost. Moreover, they are preparing some of their materials in such a way that they can be reproduced at a low cost for groups or persons desiring them. This will make them available to those who wish to have the benefit of the costly compilations and other materials in making their own sampling designs.

NOTES

THE USE OF "ADJUSTED CONDITION" FOR ESTIMATING YIELD PER ACRE

REPORTED condition of a crop is one of the oldest and the most reliable indications for forecasting yield per acre early in the season. The individual reporters report in percentage of normal. The weighted averages are prepared in State offices of Agricultural Estimates and are used generally for interpreting yield per acre. The condition is plotted on the X axis of Cartesian charts against yield per acre on the Y axis.

For certain crops during the time when cultivation is required, reported condition alone is not always a reliable indicator of final yield. In areas where rainfall may be excessive during the growing season, reporters tend to over-evaluate the outlook at such times. Vegetative growth rather than yield prospects tend to be reflected. The reverse is true in dry weather. Smaller plants with better root systems will usually produce a larger crop than is apparent, whereas succulent plants are seldom as productive as their healthy appearance would lead one to believe.

Some objective variables such as temperature and rainfall measurements have been used to explain the residuals from the regular charts of "Reported Condition vs. Board Yield."[1] The principal difficulty with this approach is that the data from many weather stations would not be immediately available when needed for current reports, and even if they were, the necessity of tabulation by districts and weighting by crop weights would "bank up" such an additional work load as to be impracticable of application in preparing monthly estimates if any number of crops were involved. In the case of rainfall even accurate and representative statistics might prove inefficient since crop progress is more closely related to effective rainfall than to actual rainfall.

As a substitute for a more objective type of measurement, another subjective figure, pasture condition, seems to offer a solution. Whatever bias there may be in reported condition of a crop should be, and seems to be, inherent also in pasture condition. This makes it possible to devise an easy corrective. Ordinarily pasture condition

[1] Board yield is the official yield per acre as adopted by the Crop Reporting Board.

is reported relatively higher than crop condition in wet weather; in dry weather pastures usually suffer more damage, and pasture condition, accordingly, is reported lower than crop conditions.

Pasture condition as an additional factor has been used in many studies during the past 10 to 15 years, and can be easily used to devise a factor for adjusting the reported crop condition. Any factor that could be used to adjust crop condition upward in dry years and downward in wet years would seem to deserve consideration for a number of crops.

The factor obtained by placing the crop condition in the numerator and pasture condition in the denominator is generally less than 1,000 in wet years and more than 1,000 in dry years. Multiplying reported crop condition by this factor gives an adjusted condition that meets the requirements indicated above as needed. Inflexibility is the principal objection to this type of adjustment. It is reasonable to expect that reported condition of a crop late in the growing season would be a truer gauge for estimating yield per acre than earlier reports, and hence would need less adjustment. Variations among crops and among States would also demand a method whereby the degree of adjustment would fit the particular crop in the particular State on a specific date.

The above objections can be overcome, and practically the same basic adjustment may be obtained with fewer calculations. The difference obtained by subtracting pasture condition from reported crop condition offers a preliminary or trial adjustment statistic. This figure is algebraically added to reported crop condition and provides the trial *adjusted condition* figure. This application lends itself to degrees of adjustment which may be readily determined with reasonable accuracy without mathematical calculations or extensive research.

To test for the needs of a given crop it is first necessary to reweight district pasture condition figures for past years by the acreages of the crop being studied. Using the newly weighted State pasture condition figures with the State weighted crop condition figures, the trial adjusted condition is worked out. It is simply reported crop condition+(reported crop condition−pasture condition). A chart is then made "Trial adjusted condition vs. Board yield." The reported condition figures should then be entered in a different color on the same chart. It will be readily apparent whether the trial adjusted condition is better than the reported condition for estimating yield. A casual observation may then be

made to determine whether a point midway between the two condition figures for each year is an improvement over both sets of figures. If so, a 50-percent adjustment is indicated. Upon further study it may be observed visually that a 25-percent or 75-percent adjustment is still more appropriate. If the trial adjusted condition is better than the others, 150 percent or higher should be roughly plotted and considered.

In setting approximate adjustments needed, one should not overlook the fact that the highest possible correlation is not always desirable for a particular date since conditions later than the date under study may explain the residuals.

After determination of the proper adjustment needed, charts would be set up using adjusted condition as indicated for the particular crop in the particular State on a specific date. Generally, it is thought that large adjustments of reported condition would be needed only early in the season—in some cases an adjustment as much as 300 percent, or reported condition crop +3 (reported condition crop−pasture condition) appears to be needed. In general, as the season progresses lower adjustments are needed.

Illustration: Sweetpotatoes in Alabama furnish a good example. The following table gives the data for August after re-weighting pasture condition with sweetpotato acreage weights.

Year	Basic data			Trial adjusted condition* (Col. 1+ Col. 3) (4)	Final adjusted condition after determination of approximate degree of adjustment needed	
	Sweetpotato condition reported (1)	Pasture condition (reweighted (2)	Trial adjustment Col. 1+ Col. 2) (3)		Col. 3×1.25 (5)	Adjusted condition (125%) Col. 1+ Col. 5
	%	%		%		%
1934	78	78	0	78	0	78
1934	78	72	+ 6	84	+ 7	85
1936	63	68	− 5	58	− 6	57
1937	77	76	+ 1	78	+ 1	78
1938	82	86	− 4	78	− 5	77
1939	76	84	− 8	68	−10	66
1940	64	86	−22	42	−27	37
1941	77	85	− 8	69	−10	67
1942	77	81	− 4	73	− 5	72
1943	82	80	+ 2	84	+ 2	84
1944	70	67	+ 3	73	+ 4	74

* Condition Sweetpotatoes+Condition Sweetpotatoes−Pasture Condition.

The above table is self-explanatory except in Column 5 in which 1.25 is used. It will be noted that on the first chart both the trial adjusted condition and the reported condition are plotted against Board yield. A casual examination will show that the trial adjusted condition correlates much more highly with yield than does the reported condition. Upon making entries (×) for each year half way between the reported and trial adjusted condition figures it will be seen that the trial adjusted condition is better than the 50 percent adjustment. If further rough projections are made on the chart (△) for 150 percent adjustment it will appear that the optimum adjustment lies somewhere between 100 and 150 percent. If 100 or 150 percent were adopted the results would probably not be widely different since changes are relative and the figures are merely indexes. Adopting 125 percent, the last 2 columns above were set up. The second chart shows the condition adjusted for approximate maximum utility. An adjusted condition would probably not be needed in irrigated areas or in States where rainfall during the growing season seldom approaches the optimum for a crop. It seems to apply particularly to the States east of the Mississippi River. Crops whose products are not visible to the observer—such as peanuts, potatoes, and sweetpotatoes—are most easily misjudged. Another problem crop, tobacco, shows large succulent leaves in wet years which weigh out relatively light, whereas in dry weather smaller leaves are surprisingly heavy. There would seem to be little validity in using adjusted condition for estimating yield of corn for silage or for such crops where bulk and stalk would correlate highly with yield per acre.

In the case of peanuts, estimates of yield per acre are not made until August 1. The August 1 charts "Reported Condition vs. Board Yield" are erratic. On the other hard even July adjusted (50 percent) condition charts for peanuts in Georgia, Florida, and Alabama provide a fairly reliable basis for yield forecasts. The August 1 charts, using adjusted (50 percent) condition, are much more serviceable than reported condition alone in these States as well as in North Carolina and Virginia.

Early season cotton yield studies for a number of years have included factors other than condition. The percentage of boll weevil infestation was the factor that explained most of the residuals from the "Reported Condition vs. Board Yield" chart. In order to prove or disprove the efficacy of condition adjustment for cotton along

the lines indicated above, reported condition for Georgia and North Carolina as of August 1 were adjusted. The adjusted condition charts were found to provide better bases for estimating yield per acre for cotton in both States than the reported condition, and in Georgia the adjusted condition chart (75 percent) provided about as much precision as was provided by the use of the boll weevil infestation as another variable. The following table gives the data for Georgia cotton.

Year	Reported condition cotton (1)	Reweighted condition pasture (2)	Cotton condition minus pasture condition (1–2) (3)	Trial adjusted condition (100%) (1+3) (4)	Adopting 75% 75×Col. 3 (5)	Adjusted condition 75% (Col. 1 +Col. 5) (6)	Average yield per acre (7)
	%	%		%		%	lbs.
1934	69	72	− 3	66	− 2	67	216
1935	73	75	− 2	71	− 1	72	235
1936	60	48	12	72	+ 9	69	228
1937	75	75	0	75	0	75	270
1938	72	86	−14	58	−10	62	204
1939	73	78	− 5	68	− 4	69	228
1940	73	81	− 8	65	− 6	67	251
1941	62	84	−22	40	−16	46	166
1942	76	78	− 2	74	− 1	75	240
1943	79	82	− 3	76	− 2	77	253
1944	72	63	+ 9	81	+ 7	79	286
1945	76	85	− 9	67	− 7	69	256

Sugar beet condition on September 1 in Michigan apparently requires 25 percent adjustment. The August 1 reported condition of soybeans in Illinois is a very reliable indication of final yield per acre. A 25 percent adjustment, however, apparently results in some improvement in relationship.

Studies on the principal types of tobacco indicate the need for adjustment. Early condition figures for the principal types generally need rather high adjustment. One type in a late maturing area seems to require 200 to 300 percent but generally an adjustment somewhere near the trial adjustment appears to be needed early in the season. For most types, 25 to 50 percent adjustment seems indicated for the last condition reported before marketings get underway. There appears to be little if any reason for adjusting a condition figure after harvest is advanced and after reliable reports of yield are available.

This simple device offers promise of improving early season yield and production forecasts of crops for which little data other than reported condition are available. Fortunately, the availability of long series of comparable pasture condition figures in all States

provides an additional resource that can be profitably utilized by the method suggested herein. To be serviceable, pasture condition needs only to be re-weighted by acreage weights of the crop under consideration.

The promising results so far attained for the several crops and States upon which the method has been tried attest only to the soundness of the principles involved. It is anticipated that an even better approach than that presented here may be evolved and many additional refinements are possible. Similar results could be obtained by plotting reported condition vs. Board Yield, and on a second chart plotting the residuals against crop conditions minus pasture condition. Where pasture condition is higher, the figure would be negative. Due to its simplicity the technique presented here is better suited to the required rapidity of the monthly reviews. The suggested approach offers an immediate opportunity to improve on present estimating procedures in the early season for several crops. It supplies a means whereby both pasture condition and reported crop condition figures will gain added utility.

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COMMON GRAZING IN THE SHORTLEAF PINE—LOBLOLLY PINE—HARDWOODS PORTION OF SOUTH ARKANSAS

FREE grazing is the practice of allowing livestock to graze at large. In the South land against which no restrictions are made for grazing is generally known as "free" or "open" range. Here free range areas include mostly timbered nonfarm lands but also some farm lands which are not fenced. Farmers in free range areas normally fence only the fields used for cultivated crops and depend almost entirely on the unfenced land for pasture, particularly during the warm grazing season months, April through October. In many Southern States a relatively large percentage of the total land area is subject to free grazing. For example, in Arkansas in 1935 slightly more than one-half of the land area of the State was subject to this practice, that is, where it was not fenced for farm or other uses. Practically no changes have been made since 1935.

The free range areas are determined by an elimination process. All areas in which livestock are not prohibited, by stock laws or

stock law improvement districts, from running at large are in free range. Areas in which free grazing is prohibited are known as closed range.

A brief review of the experience of farmers with a slight modification of free range in a single, relatively small area in Arkansas may be of interest in explaining the advantages and disadvantages of the system. Hempstead County, in the southwestern part of Arkansas, can lawfully have no free or open grazing of livestock as the entire county was closed to this practice by Act 496 of 1919, as amended by Act 140 in 1923, Special Acts of the Arkansas Legislature. This is understandable since only about 70,000 acres, or 17 percent, of the total land area, excluding that in the U. S. Government's Southwestern Proving Grounds, is nonfarm land. This compares to a little over half for the Coastal Plains portion of South Arkansas taken as a whole. However, in parts of southern and southwestern Hempstead County there is common grazing of certain kinds of livestock by general consent of land owners and local citizens. There is such an area of approximately 3,000 acres in the eastern part of Township 12S, Range 26W, and the western part of Township 12S, Range 25W.

In 1920, about a dozen men living in the two townships created a common grazing area. Both white and colored residents were included. To avoid criticism and opposition, they secured verbal assurances to the following effect:

(1) That owners of the land to be fenced did not object. All owners of nonfarm forest land whose addresses could be ascertained, were contacted. Only one or two owners were not contacted.

(2) That the county judge would give permission to construct two cattle guards on the road passing through the area to be fenced.

(3) That the rural mail carrier and other people frequently traveling this road had no objection to installation of the cattle guards.

An area of 3,030 acres was first enclosed in 1920. Two cattle guards and 1½ miles of a three strand barbed wire fence were required to enclose this acreage. No more fencing was required because existing farm fences served to complete the enclosure. When the area was first enclosed 500 acres of farm land inside the 3,030 acres were excluded from the grazing practice. In 1946 only 380 acres were thus fenced off inside the gross area.

Although in a closed range county and restricted except for livestock of the 12 residents involved, this area is for all practical pur-

poses a free grazing area. It is referred to, however, as a common grazing area. Common grazing has been practiced here long enough to present a fair idea of the results now being obtained under this type of system, which is similar to that practiced throughout most of the Coastal Plain of south Arkansas. So far as is known the residents participating in this grazing arrangement constitute a fair sample of those in the free range areas of the southern part of the State.

Ownership and Nature of Land in Common Pasture

Of the 2,650 acres being used as range in 1946, 1,830 acres were nonfarm forest land owned by 13 different persons or groups in five different states. The remaining 820 acres were farm land, part of it in a state of semi-abandonment, although they were under agreement with the Agricultural Adjustment Administration in 1942.

Of the 2,650 acres of land subject to common grazing, 340 acres were open land in 1939 when the latest aerial photographs were made. That is, approximately every eighth acre was unimproved, open pasture and seven out of each eight acres were forest land. In estimating the amount of open land, consideration was given to the open land on a school ground, and to the rights-of-way of a railroad, power line, and highway crossing the range area. By 1946, seven years later, a very appreciable amount of this open land had grown up in young timber. That this is true is indicated by the fact that local citizens say that little of the land has burned since 1936, and there is now only about one-half as much grass in the area as there was 15 to 20 years ago.

Livestock Grazed on Common Pasture

Cattle and workstock are grazed on this range area, while hogs, sheep, and goats are excluded. The cattle are grazed principally from April to October inclusive, with only a very few on the range during winter months. Workstock are grazed here mostly in the latter part of the summer and fall after crop cultivation is completed. It is estimated[1] that in the last three years a general average of 250 head of cattle and 30 head of workstock were grazed on this range pasture, the cattle using it 7 months and the workstock the

[1] Estimates are based on statements made by three of the residents using the pasture, two of these being among the principal users.

latter 3½ months of the grazing season. The numbers grazing on the range in winter season are so small that they can be ignored. It is estimated that the general average weight of the cattle when turned on the range in April is 400 pounds. Such animals are estimated to gain 200 pounds in two out of every three grazing seasons and only 50 pounds in one out of every three seasons. Thus, the usual or average gain in pounds per head of cattle on the range may be estimated to be 150 pounds per grazing season of 7 months.

It is assumed that the 30 head of workstock are approximately full animal-units and that although they are on the range only one-half the season, they consume grass equivalent to that of 30 head of cattle. Thus, it is concluded that in one season the equivalent of 280 head of cattle, weighing 400 pounds at the beginning of the grazing season, graze on the range and that they make a total gain of 42,000 pounds (280×150). The stocking rate is 9.5 acres of range land to each head of cattle. If the livestock were all the equivalent of full grown cows of 800 to 900 pounds they would require around 19 acres of this type of range. It should be recalled that 12.8 percent, or a ratio of about one out of every 8 acres of the range land, was open or abandoned fields in 1939.

If the 42,000 pound cattle gains are apportioned over the 2,650 acres common range, they amount to nearly 16 pounds per acre. Assuming a price of 6.25 cents a pound which could be received for rather low quality beef cattle in the fall of the last three or four years, the gross return from grazing averaged $1.00 per acre.

It is not known how much income the absentee owners of the nonfarm forest land have been receiving from the growth of timber. It has been customary for them to sell their timber as stumpage, generally to be cut on a diameter dimension basis. A considerable amount of stumpage was removed about 1940. Probably the rate of growth of saw-timber is no more than the 192 board feet per acre which was found for all forest land in the Coastal Plain of Arkansas in 1936 by the U. S. Forest Service.[2] Valuing the stumpage at $10.00 a thousand board feet, the annual growth per acre of forest land would gross $1.92. The sale of a small amount of cordwood from tops and thinnings should raise the amount to $2.00. Thus, grazing is providing roughly one-half as much gross income as is the timber alone.

[2] Southern Forest Experiment Station, New Orleans, Louisiana, *Forest Survey Release No. 27*, 1937.

Advantages and Disadvantages of the Common Range

There are both advantages and disadvantages in using forest land as common range such as this scheme provides. Arguments both for and against the system were advanced by those whose livestock used the range and the owners of the nonfarm forest land involved. The more important of the arguments are summarized as follows:

Advantages. The advantages of this communal ranging of cattle and workstock appear rather apparent to the local settlers who own the livestock. A dozen settlers are permitted to run from 9 to 50 head of cattle and/or lesser numbers of workstock on range land which they otherwise could not do if some such arrangement as this were not made. The summer gains generally amount to the equivalent of 3,500 pounds of beef per farmer.

An advantage of the system to the owner of the nonfarm forest land is that it assists in preventing theft of timber. The land is now completely enclosed by fence as it would not be without this grazing arrangement. The fence provides some protection against trespass. The owners of the livestock using the range are sufficiently aware of the interests of the timber land owners to report any trespassing which they see as they ride the range looking after their stock. Protection against trespass is a significant item to the 13 nonresident owners involved.

There is a prevalent belief that the owners of livestock are prone to burn free range so as to clear out the underbrush and make room for more grass. This particular area was said to have burned over in 1929 and 1936. However, when the State forest ranger and the towerman overseeing this part of the State were asked separately to point out the parts of their territory in which they had the greatest concentration of fires, each pointed out at least three localities, excluding this one, that he considered "hot" spots. When asked about this common range area in particular, each said that he had noticed no concentration of fires occurring there. Neither of these forestry officials had worked in this area more than 4 years. The fact that the area burned over rather generally in 1929 and 1936 indicates the possibility of a fire hazard, although the latter year was a dry one of wide-spread fires. As the undergrowth of trees crowds out the grass, there is a strong temptation on the part of those running livestock on a range to burn it. This is a long-established custom. Nevertheless, an absentee owner of nonfarm forest

land in this range area stated that he considered the present arrangement for grazing the land to be a distinct advantage to him in that it acted as a fire control measure. He contended that grazing kept down grass and briars and that when fire did break out it would be less severe than were the land not grazed. This owner was resigned to the fact that fire would break out sooner or later. He said that he would prefer heavy grazing to no grazing at all.

When the farmers, as well as one of the owners of the nonfarm forest land, were asked for their opinion as to whether or not the grazing was detrimental to the reproduction of the forests, they said that it was not. They emphasized that cattle and workstock seldom browse on the desirable species of trees in this area, meaning the shortleaf and loblolly pines.[3] If this range area included much bottomland where hardwoods were the predominant species, the damage to timber from grazing would be more severe than at present. None of the men interviewed recognized the possibility that the tramping of livestock might be detrimental to timber reproduction. This point can be determined better under controlled experiments.

Disadvantages. There are important disadvantages to this communal grazing scheme which the cooperating farmers acknowledge. The disadvantages are most apparent to the larger and probably more progressive operators. Chief among these are a set of circumstances which tend to result in inferior livestock being run on the range. They say that many desirable practices cannot be employed on the range, and one of them stated that if additional land were available, he would prefer to buy it and develop improved pastures for his livestock. The unfavorable circumstances may be expressed as follows:

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[3] R. S. Campbell, of the U. S. Southern Forest Experiment Station, New Orleans, Louisiana, states that foresters, stockmen, and extension workers generally indicate that when ranges of the Deep South are moderately stocked, stock does little damage to pine seedlings, but may graze some hardwood seedlings, especially in the spring, when buds are tender and growing. R. S. Campbell, "Grazing Cattle on Southern Pine Forests," *Southern Lumberman*, Dec. 15, 1944. Results of experiments by the North Carolina Agricultural Experiment Station and the U. S. Department of Agriculture indicate that cattle grazing affords some protection to the pines of the Coastal Plain through reducing the forest fire hazard and by reducing hardwood competition. J. E. Foster and H. H. Biswell, "Cattle in the Woods," *Southern Agriculturist*, Nashville, Tenn., Dec., 1946, 76: 23. Likewise, in the ponderosa pine country of Washington, foresters, ranchers and lumbermen are joining forces to prove that livestock and seedlings can thrive on the same acres. Albert Arnst, "Stock Farm in the Woods," *American Forests*, Washington, D. C., July, 1946, 52: 307–309.

(1) No farmers make any effort to improve range that is grazed in common.

(2) Only one farmer has been willing to place a pure bred bull on the range.

(3) Control of breeding time is made difficult under this system.

(4) Control of diseases, for example, black leg is said to be more difficult on the range than on the farm.

(5) Theft and killing of livestock has been something of a problem on this common range.

(6) Ticks are more numerous on the range than on the farms.

(7) Breachy or roguish livestock are turned on the range in preference to the available pastures on farms.

Summarizing, the common practices in this communal grazing area have tended, as usual, to standardize around the poorest animal husbandry practices because there has been no way to compel the farmers who use such practices to improve their methods.

Conclusions

Grazing as practiced in the area discussed is a modification of the free grazing system prevalent over much of the South. The results are fairly representative of those obtained under the usual free grazing system found here. Grazing of this common range in a single area in Arkansas has provided fairly significant returns in pounds of beef per cooperating farmer. Such returns probably would not have been possible otherwise. Disadvantages to the owners of the nonfarm forest land in this area, during the period for which information is available, have not been particularly serious. Probably the most important problem is the poor animal husbandry practice that prevails.

The common range system, judging from a single instance, is one that calls for increased community interest and effort for improvement in practices. Many of the most important measures for improvement in the utilization of land for grazing and forestry are such that they can be best effected by residents and land owners operating as a group. The fact that this common grazing area has been in operation for 27 years indicates the possibility of successful group effort in making further advancement. The residents and land owners could now take such additional steps as: acting together in preventing fires, prohibiting theft of livestock and timber, dipping and vaccinating livestock, purchasing pure bred bulls, and

in regulating breeding dates, and kinds and numbers of livestock on the range.

Thus far there has been no systematic method for putting any of these steps into effect. One large operator has placed a pure bred bull on the range; other operators could contribute toward the purchase of bulls in accordance with the numbers of cattle they graze on the range. If the resident operators agreed to cooperate in preventing fires, the land owners would probably all pay the State the usual two cents per acre annually to secure the benefit of the State-Federal fire control program.

To date informal agreements as to the numbers of cattle each operator may graze have worked satisfactorily. Those who contributed most in money and labor toward establishing the common range have been permitted to run the largest numbers of livestock. If a really constructive program for the joint utilization of this land for forestry and grazing is to be practiced, the numbers of livestock that can be grazed will sometime be materially decreased and, no doubt, the numbers permitted by each operator must then be apportioned systematically. Evidently when this common range area was started in 1920 the forests were cutover and producing far below their normal capacity. The present rate of growth of saw timber is probably not more than 192 board feet per acre. Under proper management the rate of growth can reasonably be expected to double this amount. As the forests reach their maximum annual growth they will be stocked with trees to such an extent that the restricted sunlight will result in a decreasing amount of grass and other forage. Much educational work in the interest of both improved livestock and forestry programs will be necessary before the farmers and land owners will take additional steps as they are needed.

The system of free range with modifications, such as the one discussed, is likely to be with us for many years. It has favorable possibilities in localities where there is a high proportion of nonfarm forest land. Proponents of both improved forestry and grazing need to consider the practice as it appears to the local residents and land owners. Probably in many localities a system such as this one which permits joint utilization of the nonfarm forest land will make possible a higher return from the land than if either use is followed to the exclusion of the other.

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Bureau of Agricultural Economics

EMPLOYMENT CATEGORIES IN AMERICAN AGRICULTURE

IT HAS been common for those concerned with American agriculture to confuse the *farm population* with the *farmer* population. Thus the Department of Agriculture is frequently exhorted to care for the welfare of the farmers at the expense of the laboring peoples because it is concerned with agriculture. At one point in American history the equation of farmer and agricultural population was sufficiently close to warrant its use. But it no longer approaches verity, and it is necessary to prevent such confusion if rural policy is to be formulated in terms of the welfare of all the agricultural population. A very large proportion of those engaged in agricultural production are not farmers in any sense of the word, though they are vital to our agricultural industry.

Most frequently the farm population is classified according to tenure status, with the laborers, if they are included at all, generally lumped into one category. Tenure is a poor criterion of status, however. It implies poverty, yet a new form of tenancy has arisen and in California at least is very important, in which such an imputation is far from justified. There are many tenants who choose not to invest their capital in land, but rather in production tools for high-cost operations. Another frequent classification, farm size, is significant but only if corrected for intensity of use. This is hard to accomplish with accuracy over a wide area, and it always leaves the laboring group out of consideration.

Because discussions of farm population usually leave the laboring group out of consideration and therefore perpetrate a grave error, and because the usual classificatory devices do not meet the important requirements of a significant classification, an effort is here made to present a taxonomy of the agricultural working force. This is, of course, not the first effort of the kind. A need for re-classification has long been felt, and recently a group of agricultural economists presented a classification of farms in the United States, proposing that it be made the basis for census enumeration.[1] But this classification concerned itself with farms, not farm people. The results of this work have been utilized here, and are generally recognized as of great importance, but the focus of attention naturally limits the usefulness.

[1] M. R. Benedict, H. R. Tolley, F. F. Elliott and Conrad Taeuber, "Need for a New Classification of Farms," this JOURNAL, 1944.

The taxonomy of the farm population—or rather of the working force in agriculture—proposed here is based upon the significant relationship of the individual to the other factors of production; more specifically to his employment relationship. The basic distinction here is whether he is an employer of others, a self-employed person, or an employee of others. Each group has, as will be shown below, significant subdivisions. The procedure here will be first to determine the approximate size of the various categories in American agriculture from census data and other general sources, and second, to demonstrate the practical importance of the classification.

It should be noted at the outset that this classification is not proposed as the only one of importance; but it is argued that it is one of extreme importance, and that the development of farm population data should take it into consideration at all times. Nor is it argued that each broad category is perfectly homogeneous; but it is asserted that for important policy matters the members of each of the groups indicated are affected in more or less uniform ways. Finally, it should be noted that the estimates of size are first approximations. More refined analysis of existing data could undoubtedly improve the accuracy of the calculations, and sample surveys would further correct the figures. Yet it is believed that the size categories are generally correct, and may be used until more refined data are available. This is true because the calculations have been borrowed from other students of the subject who have treated one or another aspect of farm population statistics, and the dependence of the present author upon these statisticians is specifically recognized here.

Census Classifications

It is necessary first to examine what the census presents us in the realm of employment categories. The census classifies the farm population in several ways according to different sources of data. Classified by occupation, in 1940, there were 8.2 million persons engaged in farm work; 5.1 million as farmers and managers, 1.9 as farm laborers and foremen, and 1.2 as unpaid family workers. Classified by industry, there were 8.7 million persons in agriculture. The largest estimate of workers in the industry comes from the Census of Agriculture, in which in September of 1939 there were 11.3 million persons reported working on farms, of which 8.2 were

operators or members of their families, and the remaining 3.1 were hired workers. Without further analysis, this suggests that from 23 percent to 28 percent of all persons engaged in the industry had the status of laborer.

These data are generally recognized to be inadequate in their enumeration of all persons engaged in agriculture. The fact that about 37 per cent more persons were working in the industry in September than were reporting that occupation the following April is itself testimony to this inadequacy. Research done in the field of rural population shows how much greater the total working force in agriculture exceeds even the September figures. The reasons for the discrepancy are readily understood. First, farm employment is highly seasonal, so that a farm employee does other work at other times, and much of the working force is made up of persons who are in the labor force only during local peak seasons, and therefore at other seasons of the year correctly call themselves housewives, students, etc. Second, farm labor is one of the least honorific jobs available and therefore many persons whose work records enable them to choose which occupation category they are to be enumerated in—and the seasonality of employment makes this number large—will choose to be classed under other occupations.

Estimates of the 1940 Working Force in Agriculture

The 1940 working force in agriculture numbered at least 14.5 million persons. A sample survey made in January, 1944, sought to determine all persons in the agricultural working force at any time during the previous year.[2] On the basis of this study it was estimated that the total working force in agriculture in 1943 was 14.5 million. Between 1939 and 1943 the average volume of farm employment declined by about 5 percent or half a million persons, according to data obtained from the crop reporting service.[3] According to the Census reports the decline was 1.1 million workers.[4] The former source indicates that the peak month of employment was 100,000 workers less in 1943 than in 1940; the latter that peak em-

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[2] Louis J. Ducoff and Margaret Jarman Hagood, *The Farm Working Force of of 1943*, Bureau of Agricultural Economics: USDA, Washington, D. C., 1944 (processed).

[3] *Farm Labor*, December 14, 1943 (Mimeographed report issued monthly by the Bureau of Agricultural Economics: USDA).

[4] United States Bureau of the Census, *Monthly Report of the Labor Force*, Special Surveys MRLF No. 34, April 5, 1945.

ployment declined by 1,100,000 workers. All these figures suggest that in actual fact the farm working force was greater in 1940 than it was in the year covered by the Ducoff-Hagood study. However, it is not possible to determine total working force from peak employment. The many unskilled persons working in agriculture in 1943 as a war measure may be assumed to offset a large part if not all the out-movement from agriculture. It will therefore be assumed that the total working force in 1940 was the same as shown by the Ducoff-Hagood study. The actual working force was 3.2 million workers, or about 27% greater than the largest number presented by the Census of 1940.

Classification of the 1940 Working Force in Agriculture

It is now possible to turn to a classification of this labor force. The focus of interest is upon employment status: How many are farm operators and of these how many are predominantly, occasionally, or never the employers of labor, and how many who are classed as farmers are actually not producers in the commercial sense; how many are farm laborers, and the proportions of these who have security in farm employment, no security, or only seasonally in the labor market at all.

Farm Operators.—The census of Agriculture lists 6.1 million farms and assumes one farm operator for every farm, saying that "the number of farm operators, for all practical purposes, is identical with the number of farms and these items are used interchangeably."[5] To be sure, the Census of population reports only 5.1 million employed as farmers in March, 1940, while in 1939, when the labor force was at its peak season, only 4.9 million operators reported working two or more days on their own farms. Since the definition of agricultural working force used here means the inclusion of all persons engaged in farm work at any time during the year, the 6.1 million figure must be accepted as the total number of farm operators. These should be divided into several categories:

Those farm operators whose operations depend wholly on wage labor

Those who employ one or more persons regularly, or who employ the equivalent of one man-year of labor each year

Those who hire only supplemental labor, or who hire less than one man-year of labor each year

[5] Census of Agriculture, 1940, Vol. III, *General Report by Subjects*, p. 135.

Commercial operators who hire no labor

Non-commercial operators

Sharecroppers (who generally have the prerogatives of laborers).

The Census of Agriculture showed 2.3 million farms hiring some wage labor. Of these employer-farmers, an estimated 1.3 million hire only supplemental workers while 1 million hire at least one regular laborer, with or without additional seasonal help. The latter group may be considered one of predominantly employers—that is, those who hire as much, or more, work done as they do themselves. Among this group it has been estimated that about .2 million operators depend entirely upon hired labor to do the manual work involved in their production.

The remaining operators are not employers. Many of them do not produce an appreciable amount of the total commodity production and should not be considered commercial operators. A study made of farm operators by the group of agricultural economists cited above, classifies between 600,000 and 650,000 farms as part-time, 550,000 and 600,000 as residential, and 950,000 to 1,225,000 as subsistence.[6] Taking midpoints in those classes we find that the authors would include 2.2 million farmers in the noncommercial category. There are an estimated .6 million sharecroppers. This leaves a residual group of 1.0 million non-employer commercial farmers.

These calculations may be summarized as follows: The 6.1 million operators include:

1.0 million who depend largely upon hired labor, of which perhaps a fifth operate entirely with hired labor

1.3 million who hire supplemental labor

1.0 million who hire no labor but produce in commercial quantities

2.2 million who are non-commercial farmers, and

.6 million sharecroppers.

There is the possibility of some duplication between the labor-hiring groups on one hand and the non-commercial operators on the other, for some portion of the latter do hire work done. According to Ducoff[7] 14 percent of all hired labor is reported on farms pro-

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[6] Benedict, Tolley, Elliott and Taeuber, *op. cit.*

[7] Louis J. Ducoff, *Wages of Agricultural Labor in the United States.* Technical Bulletin No. 895, U. S. Department of Agriculture, Washington, D, C., 1945. Table 3, p. 10.

ducing less than $600 value of commodities and who are, therefore classed as non-commercial operators. The census also indicates that 90,000 sharecroppers reported hired labor at some time during the preceding year.[8] If an adjustment were made to exclude those employers who produce less than $600 worth of products from the laboring group, the proportion of employing commercial farmers would be decreased. Since the non-employing commercial farmers form the residual category in these calculations, this group would thereby be increased. This adjustment has not been made.

Unpaid Family Workers.—Unpaid family workers have a peculiar position with respect to the other production factors. The nature of family relationships in American society are such that their social position and economic interests are one with the operator. Essentially, their interests are like the interest of any other non-breadwinner of the family, and depend upon the status of the family head. The proportions coming from the various categories of farmers cannot be ascertained, and it would be of questionable validity to apportion them if it could be, since other family members are not so apportioned. It might be mentioned parenthetically, that neither the economist nor the sociologist has given sufficient attention to the position of the unpaid family worker in the rural economy.

The maximum labor of this category reported in the Census was the 8.1 million who were working in September of 1939. This figure includes the farm operators. If we subtract the 4.9 million operators (one operator for each farm reporting family labor) we get 3.2 million unpaid family workers as of September, 1939. Since this is the force of unpaid family workers in an enumeration which results in 11.3 million total labor force, it is necessary to recognize the need for increasing the number of unpaid family workers. That is, some portion of the difference between the 11.3 million workers reported in 1939 and the 14.5 million workers which were employed in 1940 must be underenumeration of the family workers in the total labor force. It is assumed here that the underenumeration of unpaid family workers is proportional to the total underenumeration of non-operators employed in agriculture. In the 1939 count, the total non-operators in the labor force was 6.4 million (11.3 million reported in force minus 4.9 million reporting operator status at that

[8] United States Census of Agriculture, 1940, Vol. III, *General Report*, Table 3, p. 444.

time). Under the assumption of 14.5 million, there were 8.4 million non-operators (14.5 million in working force minus 6.1 million farm operators). The reported family labor force must, therefore, be increased by 8.4÷6.4 or 1.3, which results in a family labor force of 4.2 million persons.[9]

Hired Laborers.—If the assumption of 14.5 million persons in the farm working force is correct, and we have 6.1 million operators and 4.2 million family workers, there remains a hired labor force of 4.2 million.[10] This force is not all in the labor market during all seasons of the year and under all circumstances, but it constitutes that group of persons upon whom the farmers draw for the production of agricultural commodities. That it is a significant portion of the producing force—from the production standpoint—is indicated by the fact that it constitutes 50 to 60 percent of the labor force on the 650,000 farms which produce over half the commodities entering into commercial channels.[11]

The Census of Agriculture indicates .7 million laborers hired by the month both in September, 1939, and March, 1940. These constitute the "hired hands" in the industry. Another half million workers may be estimated as getting as much as 8 months employment in agriculture, and thereby have reasonably full agricultural employment. There remain 3.0 million workers who are employed for an inadequate season.

It must be pointed out here that this is a residual category, and contains therefore the major portion of any error resulting from any fallacy in preceding assumptions and calculations. It is, however, also the residual employment category in an economic as well as in the statistical sense. It is the category which most readily expands and contracts in relation to outside opportunity.

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[9] Perhaps it should be pointed out that the use of 6.1 million farm operators has the effect of making a similar adjustment for that category. The 1939 figure of operators in the labor force (number of farms reporting use of family labor) is 4.9 million. The operators in the total agricultural working force are, therefore, about 25% greater than the number reported working in 1939.

[10] This figure is close to the estimate made by Ducoff (*op. cit.*) who says "No data are available on the number of different persons working as hired laborers on farms during the course of a year. However, related information from a recent survey of farm labor utilization [the Ducoff-Hagood study referred to earlier] suggests that an annual average hired farm employment of 2.5 million may have involved *as many as 4 million persons* who worked for wages on farms during at least some part of the year." (Italics supplied.)

[11] Harry Schwartz, *Seasonal Farm Labor in the United States*, Columbia University Studies in the History of American Agriculture, No. 11, Columbia University Press, 1945, p. 3.

This category should, in turn, be divided into three separate groups: those who are wholly or predominantly dependent upon agriculture for their non-relief income, those who are predominantly dependent upon non-agricultural employment for their income, and those who seasonally withdraw from the labor market entirely. This last includes school children, housewives, elderly persons, and others who have means of support other than employment.

TABLE 1. EMPLOYMENT STATUS OF THE WORKING FORCE IN AGRICULTURE

Employment Category	Millions of Persons	
A. Farm Operators		
1. Operators who are predominantly employers	1.0	
2. Operators who are only secondarily employers	1.3	
3. Non-employing commercial operators (Hiring no labor but producing $600 or more annual value of products in 1939.)	1.0	
4. Non-commercial operators (part-time, residential and subsistence).	2.2	
5. Sharecroppers	.6	
Total farm operators		6.1
B. Family Workers		
6. Family workers	4.2	
Total family workers		4.2
C. Hired labor		
7. Hired hands (workers employed by the month)	.7	
8. Other regularly employed workers (receiving eight or more months of employment, but not hired by month)	.5	
9. Seasonally hired farm labor (constantly in the labor market but getting only seasonal farm employment)	1.5	
10. Hired labor only seasonally in the labor market	1.5	
Total hired labor		4.2
Total farm working force		14.5

Data are not available for making even an estimate of the proportion of workers in these three categories, though it is possible to arrive at a rough estimate of those who remove themselves from the labor force entirely. The study by Ducoff and Hagood showed that there were 3.5 million persons who had been in the farm working force during the preceding year, but who neither were working nor seeking work in January, 1944. Such workers must have come predominantly from two groups, the unpaid family workers and the seasonally employed wage laborers. These in combination amount to about 7.2 million workers. About half this group, then, are seasonally out of the labor force. Thus it seems probable that about

half the total workers in the seasonal labor category, or 1.5 million seasonally hired workers, do not seek employment except during periods of peak farm needs. The remaining 1.5 million workers include those who are employed less than eight months in agriculture and who are chiefly dependent upon farm work plus those who work less than eight months in agriculture but are chiefly dependent upon non-farm work. It should be recognized that more persons would withdraw from the labor market in relatively prosperous 1943 than would have done so in the less prosperous year of 1940.

Summary.—Table 1 summarizes these calculations. They are admittedly only first approximations, which would profit greatly from more sophisticated statistical analysis and from sample surveys. They offer, however, an approximation for categories that must be viewed as of the most significant nature for any discussion of agricultural problems or policy.

Usefulness of Classification for Matters of Rural Policy

The value of any classification rests upon its usefulness. The usefulness of the present classification is two-fold. First, it recognizes the people engaged in agricultural pursuits, rather than the farm units. And in recognizing people, it does not limit itself to one segment of the agricultural working force, but takes in the whole. Second, the classification divides the force into groups the members of which have fundamental economic characteristics in common. They are groups which each stand in relation to production in a particular way, so that the benefits and costs of public policy will fall upon the members of each group more or less alike, while such policies will affect different groups differently.

Consider, for example, the incidence of benefit that results from labor policy in agriculture. American policy for farm labor has been a negative one. That is, farm workers have been excluded from the benefits of virtually all social legislation developed since 1933. Exclusion of farm labor from minimum wage laws is obviously to the advantage of the employer. It is particularly to the advantage of the non-working employer. It is clearly to the advantage of the farmer who hires more work done on his enterprise than he himself performs. On the other hand, the exclusion of labor from coverage by minimum wage laws has been clearly to the detriment of the wage worker in agriculture. The position of the non-employing commercial farmer and of the farmer who employs incidental help

amounting to less than his own work is equivocal. It is generally argued by economists that such a farmer is ultimately paid for his labors in terms of the value of his labor in competition with the existing labor market. If this is the case, then the interests of these two categories of the farm population lie with labor. But the small farm operator generally identifies himself as a business man, and therefore with employer interests. This may be the case even though his real economic interests lie with labor. It is therefore better not to allocate either of these categories to either group, but to remember that their interest in matters pertaining to labor are ambivalent. The non-commercial operators, insofar as their farms are their only economic activity, are unaffected by the policy. Sharecroppers, though not directly affected, would stand to benefit by minimum wage legislation for farm workers. The unpaid family workers would not be directly affected, and their general attitudes and advantages would lie with the position of the chief breadwinner or farm family head in the situation. They, like all the secondary members of the household, can be left out of consideration. All the laborers, on the other hand would stand to benefit from a policy designed to support farm wages, though the position of the group of workers only seasonally in the market is anomalous. They are frequently members of either farmers' or laborers' families, and therefore to a very great extent will benefit or be deprived according to the occupation of the major breadwinner, or according to their more important occupation or source of income. Like the unpaid family worker they may be left out of consideration here.

This discussion may be summarized by the following table.

TABLE 2. ECONOMIC ALIGNMENT OF EMPLOYMENT CATEGORIES IN AGRICULTURE

Economic Interest Groups	Millions of Persons
Groups with employer interests	1.0
Groups with labor interest	3.5
Groups with ambivalent interest	2.3
Groups without direct interest	7.7
Total	14.5

The first category is made up of group 1 in table 1. The second category consists of groups 5, 7, 8 and 9, and 10 percent of group 4. The third category consists of groups 2 and 3 of table 1, and the

fourth of the remainder. The inclusion of .2 million of the non-commercial farmers (approximately 10 percent) in the labor category is an estimate of laborers in this category. The census indicates that nearly .8 million farm operators worked off their farms 150 days or more (half the working year) and that about 30 percent of the farm operators working off their farms worked on other farms. This ratio gives, in round figures, .2 million farm operators, presumably from the non-commercial category, who actually perform more farm wage labor than they perform work on their own farms.

Table 2 shows clearly that only a small portion (about 7 percent) of all those gainfully employed in agriculture stand to benefit from existing agricultural labor policy, whereas far more (about 25 percent) find it to their detriment. The ratio of direct employees to predominantly employers is three and a half to one.

This reclassification of the data has been made to demonstrate the manner in which the classification presented in table 1 can be used. Other similar arrangements of the statistics on farm population can be made, and the analysis of the incidence of benefits and costs for any farm policy or program should be made before it is adopted. Even if such use is not made, this classification should go far toward dispelling the frequent notion that the Department of Agriculture, because it deals with farm production is solely—or even predominantly—concerned with the welfare of farm operators.

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1950 WORLD CENSUS OF AGRICULTURE

The Food and Agriculture Organization of the United Nations has started the preparation of the 1950 World Census of Agriculture by submitting a preliminary program to the governments of the world. The memorandum submitted contains a list of items proposed as a minimum schedule. However, no uniform questionnaire is to be used. Governments are asked to review the suggestions and to discuss them with FAO. The census program will be resubmitted after this initial consultation. The material just sent out was prepared by experts from seven countries in cooperation with members of the FAO staff under the direction of Howard R. Tolley who heads the FAO Division of Economics and Statistics. The information to be obtained includes data on acreage and production of commodities of worldwide importance and on tenure and major

land classification. The material is limited to basic data of wide interest; it excludes some important items the collection of which, at the time of the 1950 Census, does not appear feasible. The minimum schedule includes only the *area* harvested of each crop to be enumerated, but does not include the *amounts* produced. Some countries will wish to obtain production figures through census enumeration, while others will prefer to estimate crop production through other means. However, it was urged that crop production estimates be prepared and transmitted to FAO as part of the census program. Countries should collect data soon after their harvest seasons, before general planting operations have started for a new crop season. In the northern hemisphere the census is to cover the calendar year 1949, in the southern hemisphere the year beginning July 1, 1949. The minimum size of holding to be included in the census should be made as low as possible in view of the importance of small holdings in the production of certain high-value foods. FAO recommended that censuses of fisheries and forestry be taken simultaneously with the Census of Agriculture. The desirability of coordinating the agricultural census with a census of population was stressed. Close cooperation with the Inter-American Statistical Institute that is developing plans for a 1950 Census of the Americas has been established.

It should be kept in mind that FAO is not an action agency and will not take the Census itself. Rather, it is serving as a coordinating and advisory organization among the governments that will actually engage in taking the Census of Agriculture. FAO does plan to issue world tables and regional tables summarizing information received from various countries; therefore, it is interested in achieving uniformity in statistical methods so that usable regional and world totals can be obtained. Governments were invited to suggest how FAO may assist them in their work for the census through such methods as recruitment and training of personnel, exchanging of schedules, developing cost estimates, and developing sampling surveys, where complete enumerations are not feasible. At this early stage, the stress is on complete enumeration. Sampling surveys are considered as a less desirable substitute for complete enumeration. As the time for the Census approaches, limitations in available funds and personnel will become obvious. This writer hopes that, wherever such limitations arise, FAO and the governments concerned will be flexible enough in their preparations to go

ahead with first class sampling surveys rather than insisting on complete enumeration with personnel of dubious competence or—worst of all—abandoning the taking of the census in the country or countries concerned. Modern sampling techniques yield results that may well be considered superior to results obtained from complete enumerations with unqualified personnel.

The undertaking is not unprecedented. The International Institute of Agriculture in Rome published its first International Yearbook of Agricultural Statistics for the year 1910 after authorization by the General Assembly of the Institute in 1911. The Yearbook appeared in annual or biennial editions covering every year at least until 1939. Official publications were utilized in the Yearbooks as far as possible; where official information was not available estimates derived from trustworthy private sources were adopted. In 1930, the Institute organized the first international agricultural census. A second Census of Agriculture was conducted in 1940. The publication of the results of that census as well as publication of the 1945–46 International Yearbook of Agricultural Statistics in the FAO Rome Office, the headquarters of the former International Institute of Agriculture, are being planned. In carrying out the 1950 census full use will be made of the experience gained in the conduct of the earlier censuses. Consideration is being given to utilizing the Rome office for the 1950 census on a regional or other basis.

This writer hopes that the government of the USSR—so far not a member of FAO—will cooperate with the World Census of Agriculture, because without the participation of that large country the census would fall short of its aim of being a world census. FAO considers it essential that every effort should be made to give agricultural holders assurance that their census returns will be kept confidential and will not be used for tax or regulatory purposes. While such an assurance would undoubtedly help the Census greatly and while it would be in the best Anglo-Saxon tradition, conflicts may arise in countries whose government is founded on less libertarian principles than our own.

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CROP PRODUCTION IN THE SEMI-ARID REGIONS AN INSURABLE RISK

AS A result of the extreme variations in crop yields within the semi-arid regions of the northern great plains, insurance to minimize losses from crop production is urgently needed. Farm practices based on annual climatic conditions might result in more favorable returns for the work expanded. The greatest losses from crop failure occur during exceptionally dry years and in case these years can be determined at seeding time the farmer will be able to adjust his farming program so as to avoid much of the losses that would be incurred otherwise.

A recent study of precipitation and crop yields for central South Dakota reveals significant relationships that might be applied to a crop insurance program to minimize risks and so minimize the premium costs of the insurance to the producer. The study applies particularly to the semi-arid regions within which seasonal precipitation is frequently not great enough to produce profitable yields of grains. Within this area preseasonal precipitation is essential to assure favorable yields. There is no intention to disregard or minimize the benefits of seasonal precipitation. The purpose here is to evaluate preseasonal precipitation and to show its contribution or relationship to crop production.

The preseasonal precipitation period as used in the study was from August 1 of the previous year to March 31. Due to local storms, precipitation from a single station may not represent conditions for an entire county. For use in the study, data from three neighboring stations, where soil and general climatic conditions were similar, were averaged to secure a figure that would be representative of an area. The yield data used were the average of the reported yields of wheat for the counties where the weather stations selected were located.

The study covered data for a period of 25 years from 1919 to 1943 inclusive. Data from eight counties were grouped into three areas. In Table 1 comparative data for the 25 years of the study for all three areas were used giving 75 pairs of data for analysis. Yields are shown resulting from progressive intervals in the amount of preseasonal precipitation. As precipitation increased there was a corresponding increase in the average yield reported.

The mean, or average, yield of all observations studied was 8.5

TABLE 1. REPORTED YIELDS OF SPRING WHEAT LISTED BY PROGRESSIVE INTERVALS IN THE AMOUNT OF PRESEASONAL PRECIPITATION IN INCHES FOR THREE AREAS IN CENTRAL SOUTH DAKOTA FOR THE YEARS 1919–1943 INCLUSIVE

	Preseasonal Precipitation in Inches					
	2.0"–4.99"	5.0"–7.99"		8.0"–10.99"		11.0" & over
Yield in bushels	.0	.1	7.8	4.0	11.0	14.9
	2.8	.1	9.9	4.6	8.6	9.8
		3.1	8.8	4.0	9.0	14.4
		.2	9.4	3.7	14.6	12.0
		4.6	7.2	2.4	9.0	14.9
		3.1	6.4	4.6	9.7	11.3
		.1	11.9	6.2	13.8	15.2
		2.4	7.7	.6	13.2	16.6
		4.8	9.5	5.8	10.8	12.7
		2.5	11.3		7.3	14.3
		.5	10.5		11.0	13.7
		3.8	8.9		8.9	13.2
		6.1	9.7		12.9	
			15.1		9.3	
			6.5		11.3	
			10.9		11.2	
					17.1	
					11.1	
					9.2	
					14.5	
					7.7	
					12.0	
					7.2	
No. in Interval	2	29		32		12
Total Yield	2.8	182.9		286.3		163.0
Mean Yield	1.4	6.3		8.9		13.6
Percent of Years Yields Were Below 75 Year Mean of 8.5 Bu.	100	62		38		0

Total Observations 75, Total Yield 635.0 bu.
Average Yield 8.5 bu.

bushels. The insured yield would be 6.4 bushels at 75% of the average yield. There were 24 of the 75 observations studied when yields were below 6.4 bushels. It would have required 83.5 bushels these 24 years to bring the reported yield to the insured yield of 6.4 bushels. This would have required an annual premium of 1.1 bushels to cover the losses for the 24 cases when yield was below the insured yield. The average of the yearly wheat prices received by South Dakota farmers for the 25 years of the study was $1.00 per

bushel as shown by prices published by the South Dakota crop reporting service. For purposes of application in the following illustration an annual insurance premium of one bushel per acre is assumed.

ESTIMATED COSTS OF WHEAT PRODUCTION IN CENTRAL SOUTH DAKOTA

Rent on land	$ 2.00
Cost of seed	1.50
Labor and expense preparing ground and seeding	2.75
Harvesting and threshing	2.75
Insurance premium—1 bu. of wheat at $1.00 per bu.	1.00
Total Cost	$10.00
Insurance protection—at 6.4 bu. at $1.00 per bu.	6.40
Cost above insurance coverage	$3.60

In 44 of the 75 observations preseasonal precipitation was above 8 inches. In nine of these 44 cases yields were below the insured yield of 6.4 bushels. Total insurance benefits of 21.7 bushels would have been required these nine years to bring the reported yields to the insured yield of 6.4 bushels. In 31 of the 75 observations preseasonal precipitation was below 8 inches. In 15 of these 31 cases, or practically half, yields were below the insured yield of 6.4 bushels. The total per acre insurance benefits required to bring the reported yields up to the insured yield of 6.4 bushels for the 15 years would be 61.8 bushels. An annual premium of 2.0 bushels per acre would be required during these low precipitation years to cover the risks. The low preseasonal precipitation years are, therefore, the critical years and the ones when greatest risks and losses must be assumed.

It would have been to the interest of the farmers to materially restrict the seeding of wheat during the years of deficient preseasonal precipitation. If we assume that above costs of production are correct, in all years with wheat yields below 10.0 bushels the farmer stands to suffer some loss. There were only five of the 31 times when preseasonal precipitation was below 8 inches that yields were above 10.0 bushels. Even with insurance in only one year in six of the low preseasonal precipitation years can the farmer, within this district, hope to break even with production costs.

If a plan could be worked out to restrict or entirely eliminate the seeding of wheat during these low preseasonal precipitation years the cost of the insurance would be greatly reduced as well as the

losses that must still be borne by the farmer in spite of the benefits from his insurance protection.

In case wheat is seeded during the low preseasonal precipitation years the insurance agency would have to make benefit payments in about half of these years. Suppose the farmer seeded his usual acreage of wheat during all years when preseasonal precipitation was above 8 inches. In the 44 such cases shown in the table he would have paid insurance premiums of 1.0 bushel per acre per year. There would, then, have been 44 bushels of wheat paid in as premiums. Insurance benefits for the nine years when yields were below the insured yield of 6.4 bushels would have required 21.7 bushels leaving 22.3 bushels in the reserve. In case no wheat were seeded during the low preseasonal precipitation years annual benefit payments could have been made on the basis of .72 bushel per acre on the average number of acres the farmer had seeded during the high precipitation years. The farmer would then have been able to avoid this seeding and harvesting expense and devote his time to other work on the farm.

By avoiding, in the low preseasonal precipitation years, the seeding and harvesting of crops that do not pay production costs and adapting the farm program so that the available labor could be employed at more productive work, farming in central South Dakota might well be relieved of much of the risk involved in present practices and greatly simplify the application of a crop insurance program.

Analysis of climatic data in a similar manner for each area where insurance was written might reveal relationships that would make it possible to adapt an insurance program to local conditions and might well place crop insurance on a more satisfactory basis.

RAY F. PENGRA

South Dakota State College

REVIEWS

Studies in Income and Wealth, Volume Eight. National Bureau of Economic Research, New York: 1946. Pp. xiv, 297, $3.00.

This volume includes eleven papers prepared for the 1944 annual meeting of the Conference on Research in Income and Wealth conducted under the auspices of the National Bureau of Economic Research. Most of the papers deal largely with problems of estimating national income in various countries. The difficulties of making comparisons between countries and the kinds of reconciliations needed for such comparisons are treated in some detail. In addition, there are papers dealing with the measurement of national consumption, certain welfare considerations in international policy, the relationship between the degree of industrialization and per capita income, and the estimation of income distribution.

These papers are likely to be of limited interest to the bulk of research workers in farm management or marketing, since these workers are concerned largely with individual economic units rather than with aggregates. Researchers engaged in making estimates of agricultural production and income may benefit from the contributions of Ta Chung Liu and Shan-Kwei Fong on the "Construction of National Income Tables and International Comparisons of National Incomes," and Phyllis Dean on "Measuring National Income in Colonial Territories." The problems of measuring national income in economies that have relatively little industry and where much of production is not sold are similar to those encountered in measuring agricultural income in parts of the United States.

Of interest to those dealing with agricultural policy is the paper by Louis H. Bean titled "International Industrialization and Per Capita Income." This paper discusses the relationship between the degree of industrialization and the national income in the economy. It points out that the large percentage of the population engaged in agriculture in such areas as China, India, Latin America and Africa, indicates the degree to which national income in these areas could be expanded by moving resources out of agriculture and into other industries and services. It is likely that in countries where the percentage of the population engaged in agriculture is high the "best" technology is not being used, or that industrial development has lagged. Although this thesis is not supported by adequate statistical

analysis, a number of bits of evidence are collected to lend reasonableness to it.

Those concerned with certain welfare aspects of international policy may glean some ideas from the paper "National Income as a Determinant of International Policy" presented by Arthur Smithies. Levying contributions for the support of United Nations and its various agencies involves some judgments with respect to desirable modifications in the income distribution of the people of the world as a whole. We in the U. S. have recognized certain bases for income redistribution within our national boundaries. For example, the existence of wealth and poverty side by side within the country has not been considered as contributing to a stable political organization. Progressive income taxation and the provision of certain services by government is rather widely accepted as a means for reducing the range of the income distribution.

However, we have not given much thought to transfers of income across national boundaries. Perhaps the advent of the atomic bomb makes the existence of wide variations in average per capita income between countries a more important cause for international political instability. In determining the policies of FAO and other organizations, shifts in the income distribution which are unfavorable to us perhaps should be weighted less heavily than they have been in determining international policy in the past.

O. H. BROWNLEE

Iowa State College

Managing a Farm. Sherman E. Johnson and Associates. New York: D. Van Nostrand Company Inc., 1946. Pp. 365. $2.95.

This book is a revision of Education Manual 810 "Managing a Farm" issued by the Armed Forces Institute in November, 1944 with additional chapters on "The Right Start for a Part-time Farmer" and "Summarizing and Using Farm Records."

Farm Management books in the past usually have had a strong sectional orientation as a result of the illustrative material used by the authors. This book prepared by members of the staff of the Division of Farm Management and Costs of the Department of Agriculture draws upon the entire United States for illustrative material. It successfully presents the farm management problems in a national setting with sufficient detail to be useful to young men starting farming in any part of the country.

The chapters for the most part are written for young men thinking of starting farming for themselves rather than for students in high school or college. They contain both information and advice on particular farm management problems such as "there are some people who dislike responsibility so much that they do very much better when they are working for others. Such persons should not attempt to become independent farm operators" (p. 65) and much general descriptive information on agriculture as: "Farm wages are highest in the Western States and in parts of the East near industrial centers. They are lowest in the Southeast, and are in between the two extremes in the Corn Belt" (p. 211). The book can be read by the beginning farmer with profit, either for its information on particular farm management problems or for its descriptive and illustrative material on agriculture in the different parts of the United States.

Chapter 10 "Getting the Highest Return From Each Enterprise" is probably the simplest discussion and presentation of the principle of diminishing returns in the literature. If the book were to be expanded the reviewer would suggest additional emphasis on where the beginning farmer can get local information and how he might profitably study the local problems before making financial commitments. For example a form for appraising the worth of a farm is presented on page 109. Few readers of the book will be able to use the form even though they consult local farmers and bankers, however, because of lack of information on the items of income and expenses to fill it out.

Data from Extension farm accounting projects in states in each of the major type-of-farming areas might also have beeen presented to show something of the variation in incomes each year and the major reasons why some farmers failed to earn as high incomes as others in the community.

Anyone wanting practical information on managing a farm will find this the most generally useful publication of its kind.

WALTER W. WILCOX

University of Wisconsin

Farm Business Management. H. R. Hare, Toronto, Ryerson Press, 1946. Pp. viii, 450. $3.25.

This book, in the words of the author, is designed to provide "a Canadian text in Farm Business Management for the use of stu-

dents of agriculture. These students may be in schools, colleges, universities or study groups. They may also be amongst the large number of practicing farmers whose interest in a business approach to farming in recent years has suddenly become aroused." It is primarily a text book and each chapter is followed by review questions, laboratory exercises and a well chosen list of references. The laboratory exercises are perhaps better designed for students at the high school level living on their home farms. However, the text is well adapted to college teaching and should also command the attention of a large number of practicing farmers. It should prove especially valuable to those contemplating or starting farming.

The first chapter presents an excellent picture of the characteristics of farming as an occupation with special emphasis on Canadian conditions. This is followed by a chapter "The Nature of the Farm Business in Canada" in which the author defines and delimits the field of farm management. He points out its relation to other fields of agricultural subject matter and to the general field of economics more clearly and helpfully than do most of the farm management texts that have been published in the United States. The third chapter deals with types of farming in Canada. Following are five chapters dealing with farm capital, farm land, farm labor, farm equipment, and farm buildings, fences and farm layout. The next two chapters deal with the selection of crops and livestock. The factor analysis of the farm business is covered in 4 chapters. Then follows a miscellaneous group of six chapters including farm records, marketing and prices, sources of agricultural information, selecting and acquiring a farm, farm budgeting, and the community or social aspects of farming.

In general, the material is systematically and logically arranged. The reviewer would prefer to see the chapters on selecting and acquiring a farm moved up immediately after the one on types of farming. He would also like to see the chapter on farm budgeting precede the factor analysis. This is not a serious objection since the teacher can assign the chapters in any order he prefers. No general type of organization characterizes the farm management texts in use in the United States and no two teachers follow the same sequence of subjects.

The chapter on type of farming includes a good discussion of the factors affecting types of farming but does not tie it in adequately to the types depicted in the provincial maps. A generalized map of

the agricultural regions of Canada would be desirable. Maps showing soil, topography, elevation, and climate would help the student better to understand the distribution of farming types. Most of Canada is of relatively recent agricultural development and it is quite possible that some of this factual material is not available as yet.

The chapter on farm budgeting (Planning the Annual Farm Business Program) would be improved if more emphasis was placed on the "balancing of alternatives" aspect of the subject. Too many texts written in the United States share this lack of one of the most important aspects of budget use. By the comparison of alternate plans for the same farm at different price levels the basic principle involved could be brought out more clearly. The author adheres so closely to one complete budget of a farm as to make it appear that a farm budget is a "once over-all over" affair adapted to one specific use. A use of the short cut techniques in budget analysis now coming into general use would make the whole process much less formidable and bring out the diverse uses to which the budgeting process is adapted.

This book is written specifically for Canadian students and Canadian farms. The illustrative material is drawn very largely from Canadian sources. This limits its use outside of Canada because farm management principles are more easily grasped by the student when illustrated in terms of an agriculture with which he is familiar. In justice to the author the reviewer wishes to note his familiarity with the farm management literature of the United States as indicated by his numerous references to it. While this work cannot be expected to have any general use as a text in this country and obviously was not intended as such, it is a real boon to the teacher of farm management in Canada. Moreover, any teacher of farm management in the United States who does not give it a prominent place in his library is missing a valuable and inspiring aid to his professional development.

GEORGE A. POND

University of Minnesota

Russian-American Trade. A Study of the Soviet-Foreign-trade Monopoly, Mikhail V. Condoide. Columbus, Ohio: The Bureau of Business Research, College of Commerce and Business Administration, Ohio State University, 1946. Pp. xiii, 160. $2.50.

Uninformed comment on prospects for United States trade with Russia varies all the way from highly optimistic forecasts to a disbelief in the feasibility of dealing with the Soviet Union on any terms likely to be attractive to American businessmen. The optimistic views are based largely on the enormous unsatisfied demand known to exist in Russia, plus possibly some consideration of presumably large but unspecified stocks of gold assumed to be available to the Soviet Government for purchases abroad. The author undertakes to provide a better factual basis for such prognostications, both by giving data on what trade there has been in the past between the United States and Russia, and by speculating on what Soviet trade policy is likely to be.

Chapter I deals with Russian foreign trade before 1914. Chapter II with the Soviet Economic System; and, Chapters III and IV with the general principles on which Soviet foreign trade is based. Chapter V deals with the political and economic relations between the United States and Russia, and Chapter VI with the significance of the trade between the two countries. The book's most important contribution is its factual content, largely in statistical form. The interpretations and explanations are of rather limited scope, and on some points seem less than satisfying to this reviewer. It must be recognized, however, that even competent students able to draw on documents printed in Russian, as this author is, often disagree sharply on what is occurring in Russia and what its policies are. Its internal conditions, plans, and attitudes are by no means easy to ascertain, and even a limited contribution of factual information is to be welcomed.

Up to now the trade of the United States with Russia has not been of great importance to the United States. Imports from Russia have never exceeded 1.2 percent of total American imports. Exports to Russia, though much greater in value than imports, were never important in comparison with total United States exports. Except during World Wars I and II the exports to Russia did not at any time amount to more than 4.3 percent of our total exports (1931), and usually were well under 2 percent. In 1916 they reached 8.6 percent, and in 1942, the last year for which data are given, they amounted to 17.6 percent. During the past three decades Russia's total foreign trade has in general amounted to less than 2 percent of total world trade. In 1913 it accounted for 3.3 percent of world imports and 3.9 percent of world exports. In other words,

Russia, both under the Czars and under the Soviet government, has been in the main an isolated area, taking relatively little part in the trade between nations.

While Russia's trade with the United States has been of little significance to the United States it has bulked much larger in terms of Russian foreign trade. Imports from the United States between 1924 and 1938 ranged between 4.5 percent and 28.5 percent of all Russian imports. Russian exports to the United States on the other hand never exceeded 9.6 percent of her total exports.

The chapter on the Soviet economic system, while not very specifically related to foreign trade, provides a brief summary of the mechanism through which the planning operations of the government are carried on, and some generalizations as to the objectives. For the first "Five-year Plan" (1928-1932) the major objective was the rapid industrialization of the U.S.S.R. "The production of consumer goods was minimized in favor of the largest possible expansion of factories." The second "Five-year Plan" (1933–1937) "laid stress on mastering the new methods of production, training labor, and the expansion of the production of consumer goods." This was reoriented however, from about 1934 on, so as to place the emphasis on preparations for war, and the U.S.S.R. has been, in the main, on a war basis since that time. The following discussion on the relation of prices and costs to the allocation of resources, is descriptive and no serious attempt is made to weigh the effectiveness of that system as compared to an allocation based on prices in a freer market.

Chapter III describes the official attitude with respect to foreign trade. Foreign trade is completely nationalized, and the policy looks in the main to minimizing rather than maximizing trade with other countries. Having little to export a prime consideration is to conserve gold and foreign exchange. The reader may, however, justifiably question the adequacy of such conclusions as that at the bottom of page 25 where the author says "Thus the monopoly of foreign trade served as a powerful tool for safeguarding the resources of the country." This seems to imply that foreign trade is merely something that drains wealth out of the country. It is reminiscent of the equally illogical reverse view held by many American farm groups, that foreign trade results only in bringing in unwanted goods that depress their markets.

The author concludes that, in general, the U.S.S.R. will deter-

mine what imports are essential and then decide what exports should be used in payment for them. That view, with which this reviewer sees no reason to disagree, does not imply a large volume of trade with Russia during the foreseeable future except for equipment needed in furthering the Soviet program of industrialization. Consumer goods seem not likely to be imported in any significant volume, and even production goods imports will probably be held to bare necessities.

Various other aspects of the internal and external policies of the U.S.S.R. which are touched on by the author cannot be discussed in the brief space of a review. In general, the discriminating reader will be more satisfied with the factual presentation than with some of the conclusions drawn. The author finds more merit in the Russian approach to these problems than will most American economists, and at various points it seems to this reviewer that more perspective and more penetrating analysis are needed. For example, there is little weighing of the merits of the enormously burdensome program of forced saving; little consideration of the possibility that a program of freer trade and more opportunity for private initiative might result in more rapid industrialization; as it probably did at times in Britain and the United States; and almost no comment on the bare statement that the trade arrangements will depend largely on political considerations, a proposition all too reminiscent of the methods of Nazi Germany.

It is stated that "the special conditions under which industrial production takes place in Soviet Russia eliminates a large part of the uncertainty and risk of financial insolvency which retards, severely at times, industrial expansion in other countries. . . . The 'profits' of industry go to the state and by redistributing these 'profits' between different plants, subsidizing some of them, production is stabilized, expanded, and continued without reference to short-run financial solvency or uniformly high profit returns. The state monopoly of foreign trade, moreover, prevents world prices from influencing internal prices since Russian currency is not quoted in foreign markets and cannot be exported or imported." It would seem to this reviewer that it has not been demonstrated that the Soviet system has resulted in faster or more desirable development than, for example, that of the United States in the first half of the nineteenth century which was based heavily on foreign borrowing, trade between nations, and great freedom for the individual.

No doubt the total volume of Russian accomplishment was much greater, but it was the accomplishment of a population of 170 million people in comparison to less than 25 millions in the United States of 1850, and in a period when there was far more technical knowledge available than existed in the world of 1850.

The book is a useful source of information for those interested in Russian-American trade, but most American readers will probably draw from it somewhat different conclusions than many of those implied in the generalizations made by the author. Nevertheless one can well agree with his main conclusion, namely, that large-scale trade between the United States and Russia does not appear to be in prospect in the foreseeable future.

MURRAY R. BENEDICT

University of California
March 3, 1947

Readings in the Theory of Income Distribution. Philadelphia: The Blakiston Company, 1946. Pp. xvi, 718. $4.25.

This volume is the third in the Blakiston Series of Republished Articles in Economics. Thirty-two articles, selected by a Committee of the American Economic Association under the leadership of William Fellner and Bernard F. Haley, are presented under six major headings: (1) Concept of Income and Distribution; (2) Production Functions and Marginal Productivity; (3) Wages; (4) Interest; (5) Profit; and (6) Rent. To round out the volume, Frank E. Norton, Jr., contributed a 50-page classified bibliography. The introduction by Fellner and Haley must be mentioned, for it is an able discussion of the problems and limitations of distribution theory.

In the words of Howard S. Ellis, Chairman of the Association's General Committee on Republications, " . . . the Series is oriented towards the tuition of senior and graduate university students; but there is also the hope that professional economists will find it a useful means of keeping abreast of developments in fields other than their own. Thus the Series may help to lessen the intellectual provincialism of specialists, which, it is said, threatens them with having nothing in common—not even an education" (p. v). In terms of these objectives, there can be little question as to the merits of the current volume. The articles are stimulating; they have been selected from a wide assortment of Journals and include samples of

the work of many authorities; they have been presented in a logical and pleasing order. To review such a "composite" product is obviously difficult, and especially so for a reviewer who admits to being a stranger to most of the articles listed in the extensive bibliography. The following remarks, then, represent the reaction of a nonspecialist and his opinions of the book's value to other nonspecialists among the ranks of agricultural economists.

The introductory articles on national income and personal income distribution discuss concepts that should be familiar. Yet most of us stumble over the differences between "national income" and "gross national product" and forget that many arbitrary elements are inherent in any attempt at statistical measurement. The Pareto, Gini, and Lorenz curves are widely used in discussion of personal income distribution and should be known to agricultural economists even though their usefulness may be questioned. The section on production provides the starting point for the discussions of functional shares, for marginal productivity remains the basis for most of distribution theory. The sections on wages, interest, profit, and rent develop the marginal productivity concept, point out many of its limitations, and suggest alternative approaches. In the end, the reader is left to agree with the editors that the theory of income distribution is at present incomplete.

In addition to its direct value in bringing together articles on distribution, this volume contributes by suggestion and inspiration to many other fields. The theory of the firm may be used as an illustration, since it is of interest to all agricultural economists. Cassels' article (pp. 103–118) provides the basic framework for studies in this field. Stigler (pp. 119–142) points out that short-run marginal cost curves may be relatively flat up to the point where output reaches the "capacity" of the farm or plant. His section of flexibility in plant design bears directly on the problem of combination of enterprises; consider, for example, the advantages and disadvantages of specialization and of diversification on a farm where dairy and poultry are alternatives or for a dairy plant that might manufacture butter and/or cheese. Hart's discussion of uncertainty (pp. 547–557) puts the problem of planning future production in terms of the indefinite probabilities that every farmer and plant manager must face and that have made life difficult for any agricultural economist who, for example, has tackled farm and home planning. Reynolds also discusses this point (pp. 294–313), and

concludes with an interesting section on research procedures. While these references do not constitute a complete discussion of the problem, they are very provocative and should provide the inspiration for many improvements in our researches.

This book has obvious merit in that it combines articles from many sources into a single and convenient volume. This and the quality of the particular selections will make it appeal to students and teachers. It should encourage all of us to read more widely, and so contribute to our knowledge of the problems of distribution. Finally, and by no means least important, it should stimulate thinking and research in many fields, some quite far removed from income distribution as such. I recommend it highly and feel sure that it will repay you in many ways for your attention.

RAYMOND G. BRESSLER, JR.

University of Connecticut

National Income, A Summary of Findings, by Simon Kuznets. New York: National Bureau of Economic Research, 1946. 144 pp. $1.50.

Professor Kuznets has brought together a considerable number of statistical aggregates and averages. None of the data seem to be new, with the exception of some calculations with respect to the behavior of certain economic series during business cycles. The present effort does not strike me as being particularly useful to the economist who has more than a passing interest in national income data. There is too little in the way of critical evaluation to make the book useful to the serious student. Since most of the data are available elsewhere in a more adequate form, one can better refer to the original sources—to which Professor Kuznets has contributed so much.

I find myself critical of and confused by the treatment of changes during business cycles. Professor Kuznets presents a statistic which measures "differences in rate of movement between expansion and contraction" for a series of reference cycles. The statistic does not in any sense measure the differences during expansion and during contraction for a single series, but presumably gives some insight into differences between series. It does the latter only as the individual cycles conform exactly with the reference cycles. If a particular series consistently lagged behind the reference cycle by one year, the comparisons made seem to be of little value.

Another shortcoming of the measure used—which is obtained by subtracting (algebraically) the average annual change, expressed as a percent of the average value of the series for the cycle, during the expansion from the average annual change during contraction is its failure to indicate lack of conformity of a specific cycle with the reference cycle. Even if the specific series continues to rise during a business cycle contraction, the magnitude and sign of Kuznets' measure can still be negative and very large.

The most interesting of the four chapters comprising the book is the last. In this chapter Professor Kuznets raises some of the more fundamental questions involved in the construction and interpretation of estimates of national income. He points out the basic differences between net and gross national products and some of the reasons why the latter is a useful concept. Some of the more obvious interrelationships between national income and welfare are described.

D. GALE JOHNSON

The University of Chicago

Milk Marketing Under Federal Control. Carl McFarland. Washington: Milk Industry Foundation, 1946. Pp. viii, 205.

This book is privately printed in limited number for distribution only to members of the Milk Industry Foundation. The author was formerly Assistant Attorney General of the United States and as such "had extensive experience with the legal aspects" of the Agricultural Marketing Act.

The body of the text, consisting of sixty-one pages, develop in fairly non-legal language the background, history and substance of the Agricultural Marketing Agreement Act of 1937 as it applies to milk. Further chapters discuss Procedure and Administration as well as marketing agreements and orders under the Act. One hundred thirty pages of appendices follow, including a compilation of the Act of 1937, administrative rules of practice and procedure, a detailed itemization of the legislative history of the Marketing Act relevant to milk and, finally, all references in the Federal Register to orders under the Act classified chronologically by markets. The appendices should be useful as a reference source to students of the problem.

In a brief resume of the Act such as is offered in this book, little

fundamental criticism or analysis can be expected. The chapter on Procedure and Administration offer brief comment or suggestion to handlers regarding (a) the mediation and arbitration sections of the Act which have been little used, (b) the procedure followed in framing agreements and orders, and (c) amendment of existing orders by either administrative or judicial review. The line of argument in these sections is essentially that in the hearings preceding the issuance of an order, handlers appear to be at considerable disadvantage. Hearings "tend to be conducted as 'town meetings' "; exact meanings of terms in the proposed orders are vague and facts are not established with precision. Consequently, a detailed defense is very difficult. Yet, filing of briefs must be based on factual evidence received at the hearing only. Thus, it appears that briefs may not include arguments on issues of law, and further, unless all objections are raised in the brief, it is presumed any exception to errors of fact will be waived and further proceedings precluded. Findings merely repeat the broad generalities or statements of policy contained in the statute and do not come to grips with specific factual or legal issues developed at the hearings or in the exceptions or briefs. Under these circumstances, hearings appear to be rather routine affairs in large part for the record and handlers are left to grope pretty much in the dark.

Administrative review hearings are provided for under section 15A of the Act. This provision should not lull handlers into a feeling "that the first hearing is just an 'opener' since they can have another," for "when they come to the second they may be told that they should have presented the issue in the first. Which hearing counts? If all the evidence and objections must be made in the first, what room is there for the second except in the comparatively rare situation where new facts arise? Apart from the situation where new conditions appear after the original hearing and issuance of an order or amendment, is it designed merely to give the parties and the administrative officers another chance? If an order or amendment is binding and effective after the first hearing and issuance, what is added by the second save delay?"

The safe course for handlers under the circumstances is to make the "promulgation" hearing as complete as possible and then follow through with the "15A" proceedings. After administrative remedies have been exhausted, judicial review is available. In the few cases

that have reached the Supreme Court "the Court has dealt mainly with questions of statutory validity or application rather than the sufficiency of the evidence or administrative procedure."

McFarland suggests that handlers could make their influence felt considerably more than in the past particularly with respect to price, cost and utilization facts of the market established during hearings. Formulas used in the order for price determination should be given more detailed study by handlers. The Act is likely to be subject to strong pressures during the coming period of declining prices—a situation it has not yet faced. During this period handlers may be required to take much more forceful action than they have thus far.

HARLOW W. HALVORSON

University of Minnesota

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NEWS NOTES

The annual conference of the Western Farm Economics Association will be held at Logan, Utah, on June 25, 26, and 27. The host institution will be the Utah State Agricultural College.

In development of its project to produce an International History of Food and Agriculture during World War II, the Food Research Institute, Stanford University, has concluded arrangements with cooperating authors of component volumes as follows: Harold B. Rowe, Brookings Institution (United States); Eric Roll (Combined Food Board); John Cassels and R. H. Allen (International Food Relief); E. M. H. Lloyd (Middle East); R. J. Hammond (United Kingdom); N. Jasny (Soviet Union); H. von der Decken, A. Hanau, Otto Schiller (Germany); Victor Sullam (Italy).

The Inter-American Institute of Agricultural Sciences was officially established at Turrialba, Costa Rica on December 5, 1944. An economic program has been started during the current fiscal year. Julio O. Morales is Chief of the Department of Economics and Rural Welfare.

A departmental council and four standing committees are operating to facilitate the integration of research, teaching, and extension activities in agricultural economics and sociology at Texas A & M College.

In the reorganization of agricultural fields of the College on a subject-matter basis, two departments formerly engaged in teaching, one division of the Texas Agricultural Experiment Station and several Extension specialists were grouped in a single Department of Agricultural Economics and Sociology. It is headed by L. P. Gabbard, who has directed research in farm and ranch economics for the Station since 1923.

J. C. Aakhus has accepted a position with the Agricultural Economics Department of the North Dakota Agricultural College and will be engaged in marketing research for the Agricultural Experiment Station. Mr. Aakhus completed work on his masters degree at Cornell in March, 1947.

E. Lloyd Barber, formerly with UNRRA, has joined the staff of the Division of Agricultural Finance, BAE. He will assist in research in the field of agricultural risk and insurance.

Marvin A. Brooker has returned to the University of Florida and is at present assisting with the teaching program in Agricultural Economics. On July 1, 1947, he will transfer to the Experiment Station as Agricultural Economist and will engage in marketing research.

Roland C. Bevan was appointed Associate Agricultural Economist at the University of Idaho last October. He is a graduate and has his masters' degree from the University of Minnesota and spent about 15 years in Cost Accounting work in Iowa and Minnesota. During the war, he held a number of government emergency positions, and subsequently was employed by General Mills.

Robert E. Beach, who obtained his masters' degree at the University of Denver after his return from the Armed Services, has joined the Division of Marketing and Transportation Research as Agricultural Economist.

H. Wayne Bitting, formerly Economist, Office of Price Administration has transferred to the Division of Marketing and Transportation Research as Agricultural Economist.

Karl Brandt, Economist at the Food Research Institute, Stanford University, is attending an international conference of economists, organized by Professor Hayek of the London School of Economics, at Mont Pelerin, Switzerland, April 1 to 10, 1947.

C. O. Brannen, director of the University of Arkansas Bureau of Research, has been appointed by the War Department to a mission to study the organization and coordination of research and educational centers in the U. S. Occupied Zone of Germany. Dr. Brannen will head the research phase of the mission.

H. K. Chang, Assistant Professor in Rural Sociology and Sociology at Montana State College has resigned in order to organize one of the regional offices in agricultural extension which the Chinese government is establishing this year. Dr. Chang's station will be in northwest China. In addition to his extension activities, he will establish an agricultural demonstration center in cooperation with the Chinese Northwestern College of Agriculture at Sian, China.

Marion Clawson, agricultural economist long in BAE service in the Western States, is now area leader, Bureau of Land Management, U. S. Department of the Interior at Sacramento, California.

Willard W. Cochrane, formerly head of the Income, Demand and Price Section of the Division of Statistical and Historical Research, BAE, has resigned to accept a position in the Economics and Statistics Division of the United Nations Food and Agriculture Organization. Mr. Cochrane will work on international commodity arrangements.

Samuel L. Crockett transferred to the staff of the Division of Agricultural Finance, BAE, from the Division of Land Economics. He will assist in the research work in the field of farm taxation. Mr. Crockett came to Washington from College Station, Texas, where he has been stationed since his return to the Division of Land Economics from military service.

Louis J. Ducoff has been granted a year's leave of absence from the Division of Farm Population and Rural Welfare of the Bureau of Agricultural Economics to accept a Social Science Research Council fellowship for graduate work in labor economics at American University.

Phil S. Eckert, Head of the Department of Agricultural Economics and Rural Sociology, Montana State College, has been granted a six-months' leave of absence by that institution effective July 1 to serve as a consultant

in agricultural credit at the Inter-American Institute of Agricultural Sciences at Turrialba, Costa Rica. Dr. M. M. Kelso will serve as acting head of the department in Dr. Eckert's absence.

Mordecai Ezekiel, long connected with agriculture on the national level, serving as economic advisor to two Secretaries of Agriculture, has left BAE to join the Economics Division staff of the United Nations Food and Agricultural Organization. Mr. Ezekiel's federal service began in agricultural statistics in 1919.

George V. Gaines, agricultural economics graduate of the University of Georgia, has resigned as Secretary of the Cottonseed and Peanut Crushers Association of Georgia, Atlanta, Georgia, and has accepted a position in agricultural credit with the Citizens and Southern Bank of Dublin, Georgia.

Fred L. Garlock returned to the Division of Agricultural Finance, BAE, after four years with the Commodity Credit Corporation and the Production and Marketing Administration, to resume leadership in the short-term credit research work of that division.

Charles L. Harlan, head of livestock and poultry statistical work in the Bureau of Agricultural Economics, retired March 1 after more than 26 years of government service. Generally regarded as the country's foremost authority on livestock statistics, Mr. Harlan led in developing the Department of Agriculture's methods of estimating numbers, production and supplies of livestock and livestock products.

Margaret Jarman Hagood and other members of the staff of the Division of Farm Population and Rural Welfare of the Bureau of Agricultural Economics are developing indexes for measuring change in level of living of farm operator families from 1940 to 1945 for each county of the United States.

Harvey W. Hawthorne, agricultural economist in the Division of Farm Management and Costs, BAE, died on January 20, 1947, of a heart ailment. He had retired from service in the Bureau of Agricultural Economics on reaching his 70th birthday in 1945. Harvey W. Hawthorne joined the staff of the Office of Farm Management on November 1, 1912 and served continuously until his retirement.

Donald L. Henry has accepted a position as research economist in the Agricultural Economics Division of the Federal Reserve Bank in St. Louis. Dr. Henry completed his graduate work at Purdue University in February 1947.

Ernest Carl Jones, who recently completed the requirements for the M.S. degree at Louisiana State Univeristy, has accepted a position as Assistant Professor of Agricultural Economics at Louisiana Polytechnic Institute at Ruston, Louisiana. He assumed his new duties on March 15.

Martin B. Johnson has completed a long and successful career as a range economist in the Great Plains, retiring from the Division of Farm Management and Costs, BAE, at Lincoln, Nebraska.

Klaus E. Knorr has resigned from the staff of the Food Research Institute, Stanford University, and has accepted appointment at the Institute of International Studies, Yale Universiny.

Mirko Lamer has joined the staff of the Food Research Institute as Acting Associate Economist, working upon the history of commercial fertilizers during World War II. Dr. Lamer was formerly Professor of Economics at the University of Zagreb, Yugoslavia, and director of the Croatian Institute for Economic Research.

Francis H. Lacy, Jr. has accepted a position as Agricultural Economist with the Monongehela Power Company at Fairmont, West Virginia, following completion of his masters' degree in Agricultural Economics at Purdue University in February, 1947.

Wayne A. Lee, who after release from the Army had been working with Fruit and Vegetable Branch and the Labor Branch of PMA, joined the staff of the Department of Agricultural Economics and Rural Sociology at Penn State in December. Doctor Lee will conduct research and teach in the field of fruit and vegetable marketing.

Edward L. Leland, recently with BAE, has joined the Missouri Valley Staff, Bureau of Reclamation, U. S. Department of the Interior, at Billings, Montana.

James G. Maddox, formerly Special Assistant to the Chief, BAE, is on leave doing graduate work under Dr. John D. Black at Harvard. Mr. Maddox left the Bureau in February and expects to be away for 1½ to 2 years.

Jack Magennis, formerly Purchasing Agent, Maxson Food Systems, Inc., New York, has joined the Division of Marketing and Transportation Research as Agricultural Economist.

Bynon M. Prance, agricultural economics graduate of the University of Georgia, formerly Director of the Farm and Home Program, radio station WSB, Atlanta, Georgia, has accepted a position as Agricultural Editor at the University of Georgia.

Roy L. Roberts recently transferred from the U. S. Department of Agriculture to the Social Security Administration where he will work specifically on the problems associated with the extension of the social security program to farm people. Mr. Roberts was with the Bureau of Agricultural Economics, U. S. Department of Agriculture, for seven years, the last three as a regional leader for the Division of Farm Population and Rural Welfare.

Charles R. Sayre, Jr., is now Superintendent of the Mississippi Delta Branch Experiment Station, Stoneville, Mississippi. Before his war service

in the Navy, Mr. Sayre was leader of farm management work of BAE in the Southeastern States.

LeRoy Schaffner has joined the Agricultural Economics Department of the North Dakota Agricultural College and will be engaged in marketing research for the Agricultural Experiment Station. Mr. Schaffner was formerly Industrial Analyst for the TVA.

Robert W. Schoeff has accepted a position as Assistant in Extension, Department of Agricultural Economics, with Purdue University, following completion of his masters' degree at Purdue University in February, 1947.

Raymond E. Seltzer has been appointed Assistant Agricultural Economist at the University of Arizona Agricultural Experimental Station. He will carry on research work in the field of marketing. This was the field of his undergraduate work at Illinois and his graduate study at Kanaas State College.

Felix E. Stanley, M.S. Cornell University, 1942, has accepted a position as Research Associate in the Department of Agricultural Economics at Louisiana State University, and is engaged primarily in marketing research. Mr. Stanley is a native of Louisiana, and received his B.S. degree from the College of Agriculture at Louisiana State University in 1940.

Christian A. Stokstad has rejoined the Division of Farm Management and Costs, BAE, with headquarters at Portland, Oregon, after 4½ years in the Navy.

Robert D. Stormont has accepted a position with the Phoenix Mutual Life Insurance Company following completion of his masters' degree in Agricultural Economics at Purdue University in February, 1947.

Conrad Taeuber, formerly Special Assistant to the Chief, BAE, left the Department in December 1946 to accept an assignment with the United Nations Food and Agriculture Organization. Mr. Taeuber is in the Division of Economics and Statistics and will head up the work on the 1950 World Census of Agriculture.

Layton S. Thompson, Assistant Professor in Agricultural Economics. and Economics at Montana State College, has returned to the staff after a quarter's leave in which he pursued graduate studies at the University of Chicago.

Norman R. Urquhart resigned his position as Agricultural Economist in the Division of Farm Management and Costs, BAE, to take up statistical research service in the Veterans' Administration at Baltimore, Maryland.

J. Van Rogers, Jr., recently county agricultural agent of Fayette County, Georgia, and instructor in agricultural economics at the University of Georgia, has accepted the position of Southeastern Field Repre-

sentative of the National Cottonseed Products Association, Inc., with headquarters in Atlanta.

Cruz Venstrom has transferred from the Division of Farm Management and Costs, BAE, to the Bureau of Reclamation, U. S. Department of the Interior at Sacramento, California.

Lawrence W. Witt has been appointed Associate Professor of Economics (Agricultural Economics) at Michigan State College. Dr. Witt was formerly associated with the Technical Collaboration Branch of the Office of Foreign Agricultural Relations, USDA. At Michigan State, his duties will be divided between teaching and research with major emphasis on international aspects of agriculture.